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1.0 PROJECT OBJECTIVES

The project objective is to design and construct facilities for the military that are consistent with the design and construction practices used for civilian sector projects that perform similar functions to the military projects. For example, a Company Operations Facility has the similar function as an office/warehouse in the civilian sector; therefore the design and construction practices for a company operations facility should be consistent with the design and construction of an office/warehouse building.

Comparison of Military Facilities to Civilian Facilities

Military Facility	Civilian Facility
Warriors in Transition Unit Administration Services (WTUAS)	Office Building
Soldier & Family Assistance Center (SFAC)	Community Center

*Not included in this contract

It is the Army's objective that these buildings will have a 25-year useful design life before a possible re-use/re-purpose or renovation requirement, to include normal sustainment, restoration, modernization activities and a 50-year building replacement life. Therefore, the design and construction should provide an appropriate level of quality to ensure the continued use of the facility over that time period with the application of reasonable preventive maintenance and repairs that would be industry-acceptable to a major civilian sector project OWNER. The site infrastructure will have at least a 50-year life expectancy with industry-accepted maintenance and repair cycles.

The project site should be developed for efficiency and to convey a sense of unity or connectivity with the adjacent buildings and with the Installation as a whole.

Requirements stated in this contract are minimums. Innovative, creative, and life cycle cost effective solutions, which meet or exceed these requirements are encouraged. Further, the OFFEROR is encouraged to seek solutions that will expedite construction (panelization, pre-engineered, etc.) and shorten the schedule. **The intent of the Government is to emphasize the placement of funds into functional/operational requirements. Materials and methods should reflect this by choosing the lowest Type of Construction allowed by code for this occupancy/project allowing the funding to be reflected in the quality of interior/exterior finishes and systems selected.**

1.1. SECTION ORGANIZATION

This Section is organized under 6 major "paragraphs".

- (1) Paragraph 1 is intended to define the project objectives and to provide a comparison between the military facility(ies) and comparable "civilian" type buildings.
- (2) Paragraph 2 describes the scope of the project.
- (3) Paragraph 3 provides the functional, operational and facility specific design criteria for the specific facility type(s) included in this contract or task order.
- (4) Paragraph 4 lists applicable industry and government design criteria, generally applicable to all facility types, unless otherwise indicated in the Section. It is not intended to be all-inclusive. Other industry and government standards may also be used, where necessary to produce professional designs, unless they conflict with those listed.
- (5) Paragraph 5 contains Army Standard Design Criteria, generally applicable to all facility types, unless otherwise indicated in the Section.
- (6) Paragraph 6 contains installation and project specific criteria supplementing the other 5 paragraphs.

2.0 SCOPE

2.1. WARRIORS IN TRANSITION (WT) COMPLEX

The facility floor plans for the Warriors in Transition (WT) facilities are provided in Appendix J. These drawings indicate functional and operational arrangements that meet the user's requirements. The Design/Build (D/B) contractor is required to follow these mandatory designs. Minor plan alterations are permitted to accommodate building system requirements. However, the Minimum Area Requirements shall not be reduced in order to accommodate building system requirements.

Minor plan alterations, not more than eight (8) inches, are permitted only when necessary to accommodate building system requirements. However, the Minimum Area Requirements identified in Chapter 3 shall not be reduced in order to accommodate building system requirements. Office locations shown on the facility floor plans included in this RFP shall not be altered or relocated as they meet the mandatory adjacency requirements.

2.1.1. NOT USED

2.1.2. WTUAS

Provide a standard WTUAS consisting of:

A 28 PN Extra Small One-Company Headquarters (CoHQ), 6,900 gross square feet

2.1.3. SFAC

Provide a standard Small SFAC. This facility type is to provide various services to soldiers and their family while the soldier is undergoing medical treatment. The facility will also serve as a social gathering place for scheduled activities.

The maximum gross area for the SFAC is 7,000

2.1.4. NOT USED

2.2. SITE:

Appendix J includes a conceptual site plan.

The blank site plan provides the limits of construction for the approved site.

Other concept site plans provide possible facility arrangement, orientation as well as site features and amenities. These plans are included as design development proposals and may have conflicting information. The D/B Contractor may utilize any of the included site plans in order to develop their proposal. However, it is the responsibility of the D/B Contractor to ensure their proposed site plan is in accordance with required functional, operational and building requirements as stated in the Request for Proposal (RFP) for this project. If a conflict exists between any of the concept site plans and the technical requirements of the RFP, the RFP technical requirements shall govern.

The included building renderings and elevations describe the required architectural theme for the WT facilities. These drawings are provided to convey the Government's desired architectural theme that is contextually compatible with the installation's requirements.

Provide all site improvements necessary to support the new building facilities. Refer to Paragraph 6 for additional information.

Include Antiterrorism/Force Protection measures in the facility design in accordance with applicable criteria. The Contractor shall be responsible for all repairs to existing sidewalks, pavements, curb and gutter, utilities, and/or landscaping damaged as a result of his construction activities.

Approximate area available 27.00 acres in the limits of construction, as shown on the site layout plan. Refer to Appendix J - Drawings.

2.3. GOVERNMENT-FURNISHED GOVERNMENT-INSTALLED EQUIPMENT (GFGI)

Coordinate with Government on GFGI item requirements and provide suitable structural support, brackets for projectors/VCRs/TVs, all utility connections and space with required clearances for all GFGI items. Fire extinguishers are GF/GI personal property, while fire extinguisher brackets and cabinets are Contractor furnished and installed CF/CI. Include tables/cabinets/carts/etc. for GFGI equipment that is not freestanding in furniture design. All Computers and related hardware, copiers, faxes, printers, video projectors, VCRs and TVs microwave ovens, electric ranges, refrigerators, washers, dryers, and fire extinguishers are GFGI.

The following are also GFGI items: Childcare video monitoring equipment.

- Vending Machines
- Ice Makers
- Dumpsters

2.4. FURNITURE REQUIREMENTS

Provide furniture design for all spaces listed in Chapter 3 and including any existing furniture and equipment to be re-used. Coordinate with the user to define requirements for furniture systems, movable furniture, storage systems, equipment, any existing items to be reused, etc. Early coordination of furniture design is required for a complete and usable facility.

The procurement and installation of furniture is NOT included in this contract. Furniture will be provided and installed under a separate furniture vendor/installer contract. The general contractor shall accommodate that effort with allowance for entry of the furniture vendor/installer onto this project site at the appropriate time to permit completion of the furniture installation for a complete and usable facility to coincide with the Beneficial Occupancy Date (BOD) of this project. The furniture vendor/installer contract will include all electrical pre-wiring and the whips for final connection to the building electrical systems however; the general contractor shall make the final connections to the building electrical systems under this contract. Furthermore, the general contractor shall provide all Information/Technology (IT) wiring (i.e. LAN, phone, etc.) up to and including the face plate of all freestanding

and/or systems furniture desk tops as applicable, the services to install the cable and face plates in the furniture, the coordination with the furniture vendor/installer to accomplish the installation at the appropriate time, and all the final IT connections to the building systems under this contract.

The Government reserves the right to change the method for procurement of and installation of furniture to Contractor Furnished/Contractor Installed (CF/CI). CF/CI furniture will require competitive open market procurement by the Contractor using the Furniture, Fixtures and Equipment (FF&E) package.

2.5. NOT USED

3.0 WARRIORS IN TRANSITION COMPLEX (WT)

3.1. General

WT Complexes are required by the Army to encompass living, training, social interaction and administrative/command operations. This Request for Proposal includes the following facilities in the WT Complex: WTUAS, SFAC, . These facilities with outdoor areas and any additional support facilities shall be arranged on the site as a unit to allow injured or temporarily disabled soldiers to live, eat, train, and work together.

WTUAS are comprised of administration, command operations, special functions, storage and other support areas.

SFAC is a community building for social interaction and special assistance to the soldiers and their families.

3.2. FUNCTIONAL AND AREA REQUIREMENTS

Gross building area shall be calculated in accordance with Appendix Q. Net area is measured to the inside face of the room or space walls. Minimum dimension where stated shall be measured to the inside face of the defining enclosure. Net area requirements for programmed spaces are included in this paragraph. If net area requirements are not specified, the space shall be sized to accommodate the required function and to comply with code requirements, overall gross area limitations, and any other requirement of this RFP. Area requirements for corridors, stairs, electrical rooms, and mechanical rooms will typically be left to the discretion of the offeror but shall be counted in the general authorized gross square footage for each facility. Coordinate column spacing and layout with the building's floor plan so that columns occur within or in alignment with walls where they may be concealed as much as possible. Hold columns occurring within spaces to a minimum and limit them to larger public spaces. Plan column placement such that they do not interfere with the functionality of the space.

3.2.1. ACCESSIBILITY REQUIREMENTS

General Requirements: All buildings in the WT Complex shall be accessible and shall comply with the Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities as currently amended.

"Compliant" Apartment: The Army Standard for WT Complexes requires a minimum of 10% of apartments, based on the total number of apartments constructed, to be fully compliant with the Accessibility Guidelines set forth in the ABA as currently amended.

"Adaptable" Apartment: The Army Standard for WT Complexes requires that 100% of apartments constructed be connected to the building entrance via an accessible route and shall be designed and constructed in such a manner that all contain the following features of adaptable design: (A) An accessible route into and through the apartment; (B) Light switches, electrical outlets, thermostats, and other environmental controls be placed in accessible locations; (C) Reinforcements in bathroom walls to allow later installation of grab bars around the toilet, tub, shower, stall and shower seat where such facilities are provided; and (D) Kitchens and bathrooms such that an individual in a wheelchair can maneuver about the space. Adaptable Design features shall be designed in compliance with the ABA Accessibility Guidelines as currently amended.

Elevators: The Army Standard for WT Complexes requires that an elevator be provided for any building which exceeds one-story (1-Story). The elevator system shall fully comply with ASME A17.1 and ASME A17.2.1 in their entirety, as well as any additional requirements specified herein. Primary elevators shall be centrally located within the facility and shall have a minimum rated load capacity of 3,500 lb (1588 kg), with center opening doors and interior dimensions sized to accommodate a fully extended Emergency Medical Services (EMS) gurney, approximately 24 inches wide by 77 inches long, and four average sized adults. An additional elevator, meeting all specifications outlined above, shall be provided for every additional one-hundred (100) persons, or fraction thereof over the first one-hundred (100) persons the building is designed to accommodate, unless determined otherwise by a foot-traffic analysis. Such foot-traffic analysis shall be included in the general facility Design Analysis. All elevator interior walls, doors, and fixtures shall have a Satin No. 4 Stainless Steel Finish. All elevators shall be furnished with removable hanging protective pads and fixed hooks to facilitate conversion to use for moving freight.

Elevator Machinery Spaces: Elevator pits, penthouses, and other such elevator equipment spaces are exempt from accessibility requirements in accordance with ABA Section F203.6.

Certified Elevator Inspector: The Elevator Inspector shall be certified in accordance with the requirements of ASME A17.1 and ASME QEI-1 and licensed as a Certified Elevator Inspector by the State where the project is constructed. The Certified Elevator Inspector shall inspect the installation of the elevator(s) to assure that the installation conforms to all contract requirements. The Certified Elevator Inspector shall be directly employed by the Prime Contractor and shall be independent of the Elevator System Manufacturer and the Elevator System Installer.

3.2.2. Not Used

3.2.3. CoHQ (Note: Not all offices are included on every building size. See 3.2.3.2 Space Allocation Table).

3.2.3.1. Functional Space Requirements

- (a) Commander: Provide a private administrative office.
- (b) Executive Officer: Provide a private administrative office.
- (c) Supervisory Case Manager: Provide a private administrative office.
- (d) Nurse Case Manager: Provide a private administrative office.
- (e) Case Manager: Provide a private administrative office.
- (f) First Sergeant: Provide a private administrative office.
- (g) Platoon Sergeant: Provide a private administrative office.
- (h) Squad Leader: Provide a private administrative office.
- (i) Social Worker: Provide a private administrative office.
- (j) Extra Office: Provide a private administrative office.
- (k) Conference Room: Self Explanatory.
- (l) Supply Room: Provide room for miscellaneous administrative supplies.
- (m) Records Room: Provide room for administrative records storage.
- (n) Reception/Waiting Room: Provide a vestibule between the exterior and the reception/waiting room. Provide a minimum of 7 feet clearance between doors. Provide a means for the doors to open automatically via a sensor or push button. Provide a reception station consisting of a built-in reception counter for each company (shall be combined in a multi-company setting). Reception counter shall be capable of serving both able and disabled personnel.
- (o) Distribution Center: Provide room for administration personnel to provide support service for the distribution of materials.
- (p) Copier and Fax Room: Self explanatory.
- (q) Interior Corridors: Provide 6 feet minimum wide corridors.
- (r) Men's Restrooms: Provide toilet facilities and one shower stall to serve the public and administrative personnel assigned to the building. Provide a dressing area with a built-in 18 in. bench adjacent to the shower stall. Showers will only be provided in staff restrooms in those buildings where public and staff restrooms are separated.
- (s) Women's Restrooms: Provide toilet facilities and one shower stall to serve the public and administrative personnel assigned to the building. Provide a dressing area with a built-in 18 in. bench adjacent to the shower stall. Showers will only be provided in staff restrooms in those buildings where public and staff restrooms are separated.
- (t) Janitor Closet: Provide with a 10 in. deep floor mounted stainless steel mop sink with hot and cold service faucet, a four holder mop rack, and two 18 in. deep by 48 in. long heavy duty stainless steel shelves for storage of cleaning supplies. Provide space for storage of buckets and a vacuum.
- (u) Open Office Space: Provide space for multiple cubicles for administrative personnel. See 3.2.3.2 Allocation Table for requirements.
- (v) Kitchenette: Provide a countertop with both lower and upper storage cabinets (including shelves) with a double sink. Provide space for a microwave oven. Provide space for a full size refrigerator 28 in. wide. Provide seating space for a minimum of two 36 in. x 36 in. (or 36 in. diameter) tables with four chairs each and space for two vending machines.

(w) Mechanical, Electrical, and Telecommunications Rooms: Mechanical rooms shall accommodate space for equipment maintenance/repair access without having to remove other equipment. Mechanical, electrical and telecommunications rooms shall be keyed separately for access by Installation maintenance personnel. First floor exterior access is required for centralized mechanical room. Refer to paragraphs 3.6 MECHANICAL REQUIREMENTS and 3.7 ELECTRICAL AND TELECOMMUNICATIONS REQUIREMENTS for additional information.

3.2.3.2. Space Allocation Table

CoHQ MINIMUM AREA REQUIREMENTS								
NET SQ FT (NSF) PER ROOM								
NAME	X-Small ²		Small ²		Medium ²		Large ²	
	Ea	Area	Ea	Area	Ea	Area	Ea	Area
COMMANDER	1	120	1	120	1	120	1	120
EXECUTIVE OFFICER	NR		NR		1	120	1	120
SUPERVISORY CASE MGR	NR		NR		1	120	1	120
CASE MANAGER	1	120	1	120	2	120	4	120
FIRST SERGEANT	1	120	1	120	1	120	1	120
PLATOON SERGEANT	2	120	2	120	3	120	3	120
SQUAD LEADER	3	140	4	140	6	140	6	140
SOCIAL WORKER	1	120	1	120	NR		NR	
NURSE CASE MANAGER	2	120	3	120	4	120	8	120
EXTRA OFFICE	NR		2	120	NR		NR	
MEDICAL NCO - See Note 1	1	48	1	48	NR		1	48
TRAINING SPECIALIST- See Note 1	1	48	2	48	2	48	2	48
OCCUPATIONAL THERAPY ASST- See Note 1	1	48	1	48	1	48	1	48
FINANCIAL TECH SPEC - See Note 1	1	48	2	48	1	48	2	48
MEDICAL SUPPORT ASST- See Note 1	1	48	2	48	1	48	2	48
SUPPLY TECHNICIAN - See Note 1	1	48	1	48	2	48	1	48
HR SPECIALIST- See Note 1	1	48	2	48	1	48	2	48
HR ASSISTANT- See Note 1	NR		NR		3	48	NR	
FAMILY READINESS SUPPORT ASST- See Note 1	1	48	1	48	1	48	1	48
COPIER & FAX	1	96	1	96	1	96	1	96
KITCHENNETTE	1	100	1	100	1	100	1	100
RECORDS ROOM	1	100	1	100	1	100	1	100
DISTRIBUTION CENTER	1	110	1	110	1	110	1	110
CONFERENCE ROOM	1	255	1	255	1	255	1	255
SUPPLY ROOM	1	100	1	100	1	100	1	100
RECEPTION / WAITING ROOM	1	250	1	250	1	250	1	250
JANITOR'S CLOSET	1	20	1	20	1	40	1	40
BUILDING SUPPORT AREAS (Restrooms, Mechanical, Telecommunications, Electrical, etc	As needed		As needed		As needed		As needed	

NR - No Requirement

Notes:

- (1) Collocated in "open office" area (cubicles).
- (2) Numbers in table are per company.
- (3) One per facility when multiple CoHQs are combined

3.2.4. Not Used

3.2.5. SFAC

3.2.5.1. Functional Space Requirements

- (a) Reception Area: Provide a large waiting/lounge area immediately adjacent to building entry. The large space will be used as a social interaction space for soldiers and their families. It will also serve as a waiting room for soldiers/families waiting to be assisted by staff members in the administrative areas. Provide a welcoming and warm atmosphere preferably with a visual connection to outside wooded areas and/or courtyard. A central gas-fired fireplace is a mandatory feature of this space. The fireplace shall be back to back type, also serving the exterior courtyard area. Provide a built-in reception desk for 2 people adjacent to administrative office area. Reception desk shall be able to oversee operations around the reception area. Reception desk must be able to serve both able and disabled personnel. Provide space for an ATM kiosk located within the reception area. The kiosk shall be within visual control of the reception desk. Provide a dual height electric water cooler in the vicinity of the public restrooms. The exterior courtyard area shall have roofed seating areas adjacent to building for tables and chairs. Provide a vestibule between the exterior and the reception area. Provide a minimum of 7 feet clearance between interior and exterior doors. Provide a means for the doors to open automatically via a sensor or push button.
- (b) Public Computer Access Room: Provide chair-height counter space along room perimeter to accommodate 6 chairs for personnel utilizing individual personal computers.
- (c) Multi-Use/Conference Room: Provide a room for social gatherings and conferences. Provide a minimum 50 NSF chair storage room accessible from within the multi-use/conference room.
- (d) Nourishment Center: Provide a nourishment center that will serve as a snack bar / food preparation and serving area. Provide a built-in countertop with under/overhead storage cabinets (including shelves), space for a standard size GFGI under the counter dishwasher, space for a GFGI standard size residential oven/4-burner range combo 30 in. wide with hooded exhaust, double stainless steel sink with garbage disposal, shelf for a GFGI microwave, space for a GFGI full size refrigerator 28 in. wide. Provide space for a minimum of two GFGI vending machines and trash/recycle receptacles. Provide a pass-through opening from the nourishment center to the multi-use/conference room.
- (e) Provide private and open offices for staff as outlined in 3.2.5.2 Space Allocation Table.
- (f) Child Activity Room and Exterior Playground: Provide a room for child activities for different age groups, mainly infants and toddlers. Room shall have its own restrooms designed for each age group population. Provide one diaper changing station measuring 35 ¼" H x 60 ½" W x 24" D minimum with a sink and storage for fourteen (14) underneath storage trays. An exhaust fan is required at the diaper changing station capable of exhausting 100 – 150 cfm. The diaper changing table shall have an integral 6" lip to prevent infant from rolling off and an unbreakable mirror installed along the back wall. The sink at the diaper changing station shall have a Goose-neck faucet with wrist blade handles. Retractable stairs which lock into place are also required. Provide one food preparation area with space for full size refrigerator 30 in. wide, built-in solid surface countertop with microwave, two separate stainless steel sinks and upper and lower cabinets. Provide a built-in sign-in desk located immediately inside the room entrance with power and a data port (See drawings in Appendix J). The built-in desk shall be a minimum of 4 feet long and must contain a lockable coat closet to store coats and personal items. Provide storage cubicles for a population of 12 children and adequate storage shelving for books, magazines, toys, etc. See drawings in Appendix J. Provide a doorbell button in the reception area adjacent to the door leading into the child activity room. Doorbell shall be located inside the child activity room and shall be audible throughout the entire room. Interior door into activity room shall not be capable of being opened by guests within the reception area. See paragraph 3.3 SITE REQUIREMENTS for playground requirements.
- (g) Men's Restrooms: Provide toilet facilities to serve the public and administrative personnel assigned to the SFAC.
- (h) Women's Restrooms: Provide toilet facilities to serve the public and administrative personnel assigned to the SFAC.

- (i) Janitor Closet: Provide with a 10 in. deep floor mounted stainless steel mop sink with hot and cold service faucet, a four holder mop rack, and two 18 in. deep by 48 in. long heavy duty stainless steel shelves for storage of cleaning supplies. Provide space for storage of buckets and a vacuum.
- (j) Interior Corridors: Provide 6 feet minimum wide interior corridors.
- (k) Mechanical, Electrical, and Telecommunications Rooms: Mechanical rooms shall accommodate space for equipment maintenance/repair access without having to remove other equipment. Mechanical, electrical and telecommunications rooms shall be keyed separately for access by Installation maintenance personnel. Refer to paragraphs 3.6 MECHANICAL REQUIREMENTS and 3.7 ELECTRICAL AND TELECOMMUNICATIONS REQUIREMENTS for additional information.
- (l) Camera Room: Provide a room for a video monitoring security equipment rack. Rack is 36 in. wide by 30 in. deep by 84 in. high. Provide 3 feet working clearance behind rack. Provide 2 feet working clearance on at least one side and in front of rack. Space shall be conditioned with same equipment required for the telecommunications room.
- (m) The wall perpendicular to the diaper changing station shall be no more than 54 inches high from the finished floor. There shall be no door at the entrance to the pre-toddler/toddler toilet to allow supervision from the caregiver.

3.2.5.2. Space Allocation Table

SFAC MINIMUM AREA REQUIREMENTS NET SQUARE FEET (NSF) PER ROOM				
NAME	SMALL		LARGE	
RECEPTION AREA	1,650		2,760	
PUBLIC COMPUTER ACCESS	160		240	
MULTI-USE/CONFERENCE ROOM W/ CHAIR STORAGE	450 (400/50)		1095 (1000/95)	
NOURISHMENT CENTER	195		450	
CHILD ACTIVITY ROOM	870		1,400	
STORAGE ROOM	N/A		140	
EXTERIOR COURTYARD - SEE NOTE 1	500		800	
BUILDING SUPPORT AREAS (Cam Room, Mechanical, Communications, Electrical, & Restrooms, etc.)	AS NEEDED		AS NEEDED	
ADMINISTRATIVE OFFICES				
OFFICE	QTY		QTY	
DIRECTOR	1	140	1	140
FAMILY SUPPORT	1	160	1	230
DISTRIBUTION CENTER	1	140	1	260
STORAGE ROOM	1	140	1	140
STORAGE ROOM			1	40
SOCIAL SERVICES ASSISTANT	1	140	1	140
VOLUNTEER	1	140	-	-
CHAPLAIN	1	140	1	140
TRANSITIONAL EMPLOYMENT	-	-	1	140
DFAS	-	-	2	140
DFAS/TRANSITIONAL EMPLOYMENT	1	140	-	-
MILITARY BENEFITS/ID PROCESSING	1	140	1	140
MILITARY BENEFITS	-	-	1	140
EDUCATION	1	140	2	140
VA	-	-	1	140
TSGLI	-	-	1	140
AW2	-	-	1	140

OUTREACH	-	-	1	140
ACS I & R (INFO EXPL)	-	-	1	140
FINANCIAL COUNSEL	-	-	1	140
OPEN OFFICES (CUBICLES)				
NCOIC	-	-	1	64
ADMINISTRATION	-	-	1	64
LEGAL	-	-	1	64
C & Y SERVICES	-	-	1	64
CPAC	-	-	1	64
VOLUNTEER	-	-	2	64
OPEN	-	-	1	64

Note:

- (1) Areas shown are for roofed areas, courtyard may be larger as allowed by overall building area.
- (2) Director's Office shall be adjacent to the Reception waiting area and accessible to parents and visitors.
- (3) Storage Room (140 sf) in the Large SFAC Reception Area (located behind the reception desk) shall be a conditioned space
- (4) Storage Room (140 sf) in the Large and Small SFAC Administrative Office area shall be a conditioned space.

3.2.6. Not Used

3.3. SITE REQUIREMENTS

3.3.1. Walks: Construct pedestrian walks within the designated construction area and connect to existing sidewalks, where applicable.

- (a) The geometric design of walks for pedestrian circulation shall adhere to UFC 3-210-01A "Area Planning, Site Planning, and Design".
- (b) Sidewalks shall be a minimum of 6 feet wide. Sidewalks designed to support emergency vehicle traffic shall be a minimum of 20 feet wide per NFPA requirements. Sidewalks designed to support service vehicle traffic shall be a minimum of 10 feet wide. Construct walks paralleling buildings beyond the eave drip line and at least 5 feet from the foundation.
- (c) Construct non-vehicular pedestrian sidewalks of Portland Cement Concrete having a minimum nominal thickness of 4 inches. Design joint patterns uniformly, symmetrical, and in accordance with the American Association of State Highway and Transportation Officials (AASHTO) standards. For joints, do not exceed the length to width ratio of 1.25 for non-reinforced pavements.
- (d) Sidewalks designed to support emergency and service vehicle traffic will be considered roadway pavements and shall be designed to meet the AASHTO standards. Construct vehicular supported walks of Portland Cement Concrete having a minimum nominal thickness of 7 inches. Design joints uniformly, symmetrical, and in accordance with AASHTO standards. Do not exceed the length to width ratio of 1.25 for non-reinforced pavements.

3.3.2. Site Structures and Amenities

- (a) Dumpster Area: The Contractor shall locate, design, and construct the dumpster enclosure area(s) and screening. Dumpster screening shall be aesthetically and architecturally compatible with the building it serves and shall be designed in accordance with Installation Guidelines. Locate the dumpster areas in accordance with UFC 4-010-01 "DoD Minimum Antiterrorism Standards for Buildings". Position the GFGI dumpsters outside of restricted areas to allow for servicing activities.
- (b) Not Used
- (c) Child Outdoor Play Area: The outdoor play area must meet guidelines contained in the Consumer Products Safety Commission (CPSC) Handbook for Public Playground Safety, the American Society for Testing

Materials (ASTM) F-1487-93, UFC 3-210-04 Chapter 7 "Children's Outdoor Play Area, Child Safety Requirements for Outdoor Play Areas", and any ABA guidelines for Play Areas (www.access-board.gov).

Design and construct the play area within allotted programmed funds. The play area shall be a minimum 50 foot by 60 foot area surrounded by a 4 foot high vinyl coated chain-link security type fence. Provide a 3 foot wide gate to allow emergency egress. The gate shall allow keyed entry only and the exit from the playground shall have an adult controlled securing device. Cut off the fence bolts so no more than two threads are exposed and cover the end with plastic caps or silicone caulk. Install the bolts so that the threaded end faces away from the play area.

The play area shall contain four foot (4') wide trike paths/sidewalks, a minimum 12-foot by 12-foot (12' x12') shade structure, a hard surface area with a basketball goal, a composite play system for ages two to five, and benches for viewing each area. Also provide swings if space is available.

Provide a safety surface throughout all use zones and under all play equipment. The safety surface shall be a unitary or poured in place material. The safety surface in the swing zone shall be wood fiber, with approved rubber matting at the foot contact point underneath the swings. Provide a unitary safety surface beneath infant swings.

Provide landscaping. Poisonous plants, plants with thorns, and fruit bearing plants are not permitted.

Provide a frost/freeze protected hose bib 18 inches above finished grade with removable cut off handles and integral vacuum breakers.

3.3.3. Site Functional Requirements

(a) Travel Distance: The CoHQ shall be no more than 160 feet from the WT Barracks. The distance shall be measured based on a pedestrian's path of travel from an entrance of one building to the nearest entrance of the other building.

(b) Privately Owned Vehicle (POV) Parking: The Contractor shall design and construct the POV parking, within the designated construction area. Base the location and design of the POV parking area(s) on the Installation's site constraints. Either consolidate the parking or position it along the perimeter of the complex. The Contractor shall ensure that the location of parking complies with UFC 4-010-01. See paragraph 5.2.3, "VEHICLE PAVEMENTS", for additional information. Provide POV parking as follows:

WTUAS:

Provide POV parking spaces for 90 percent of the personnel plus 10 parking spaces for visitor parking. Provide handicap parking in accordance with the Americans with Disabilities Act Section 4.1.2. The maximum travel distance from POV parking to the buildings shall not exceed a distance of 1200 feet. The maximum travel distance from handicap parking to the buildings shall not exceed a distance of 225 feet.

SFAC:

Provide a minimum 20 [2 are handicap] POV parking spaces.

(c) Service Drives: The Contractor shall provide service drives to each building. Locate the drives in accordance with UFC 4-010-01. Restrict access to the drives, where applicable, as required by UFC 4-010-01. Design the pavements as required by paragraph 5.2.3, "VEHICLE PAVEMENTS". The minimum access drive width shall be 10 feet. The Contractor shall design and construct drives with curbs and gutters when necessary for drainage purposes.

(d) Fire Access Lanes: The Contractor shall provide fire access lanes to each building. Access must be within 33 feet of a building's entrance. Design the fire access lanes in accordance with NFPA 1, UFC-3-600-01, and the installation's requirements.

(e) Drop off Lane: The Contractor shall provide drop off lanes at the WT Barracks and the SFAC. The drop lanes shall be ABA accessible.

3.4. ARCHITECTURAL REQUIREMENTS

3.4.1. Hardware

3.4.1.1. Non-Destructive Emergency Access System: Fire Department Secure Lock-Box: Furnish and install a Knox-Vault 4400 Series (Single Lock Model) mounted at each building exterior adjacent to the Main Entry.

3.4.1.2. Finish Hardware: All requirements for hardware keying shall be coordinated with the Contracting Officer. Extension of the existing Installation keying system shall be provided, the Installation keying system is BEST. Cores shall have not less than seven pins; cylinders shall have key-removable type cores. Locksets for mechanical, electrical and communications rooms only shall be keyed to the existing Installation Master Keying System. HVAC terminal units that are accessed from a central corridor shall have a deadbolt to minimize protrusion into corridor. Plastic cores are unacceptable.

3.4.1.3. Not Used

3.4.2. Special Acoustical Requirements

3.4.2.1. Exterior walls and roof/floor/ceiling assemblies, doors, windows and interior partitions shall be designed to provide for attenuation of external noise sources such as airfields in accordance with applicable criteria. Provide sound insulation to meet a minimum rating of STC 42 at interior walls and floor/ceiling assemblies. At interior doors provide solid core wood doors in metal frame with sound insulation to meet a minimum rating of STC 25. In addition to the sound insulation required, video teleconferencing areas shall meet a Noise Criteria (NC) 30 rating in accordance with ASHRAE Fundamentals Handbook.

3.4.2.2. Sound conditions and levels for interior spaces, due to the operation of mechanical and electrical systems and devices, shall not exceed levels as recommended by ASHRAE handbook criteria.

3.4.3. Exterior Design Objectives

Provide durable and easily maintainable materials. Do not use exterior materials that require periodic repainting or similar refinishing processes. Material exposed to weather shall be factory pre-finished, integrally colored or provided with intrinsic weathering finish.

3.4.3.1. Exterior Walls: Where Exterior Insulation and Finish Systems (EIFS), or any other material except CMU or other Masonry material is used as exterior finish material, it shall be in conjunction with a CMU wainscot. EIFS shall be "high-impact" type and shall be "drainable" type.

3.4.3.2. Roof: Minimum roof slope for membrane roof systems shall be 1/4 inch per foot.

3.4.3.3. Trim and Flashing: Gutters, downspouts, and fascias shall be factory pre-finished metal and shall comply with SMACNA Architectural Sheet Metal Manual.

3.4.3.4. Bird Habitat Mitigation: The Contractor shall provide details in the design necessary to eliminate the congregating and nesting of birds at, on, and in the facility.

3.4.3.5. Exterior Doors and Frames:

(a) Main Entrance Doors: Provide aluminum storefront doors and frames with Architectural Class 1 anodized finish, fully glazed, with medium or wide stile for entry into lobbies or corridors. Framing systems shall have thermal-break design. Storefront systems shall comply with wind-load requirements of applicable codes and criteria including UFC 4-010-01.

(b) Other exterior Doors: Provide galvanized insulated hollow metal exterior doors for entry to all spaces other than corridors, lobbies, or reception/waiting rooms. Doors and frames shall comply with ANSI A250.8/SDI 100. Doors shall be heavy duty (grade 2) insulated with 18-gage steel cladding; top edge closed flush; A60 galvanized. Frames shall be 12-gauge, with continuously welded mitered corners and seamless face joints. Doors and frames shall be constructed of hot dipped zinc coated steel sheet, complying with ASTM A653, Commercial Steel, Type B, minimum A40 coating weight; factory primed. Fire-rated openings shall comply with applicable codes, and the requirements of the labeling authority. Door and frame installation shall comply with applicable codes and criteria including UFC 4-010-01.

3.4.3.6. Exterior Windows: Provide insulated, high efficiency window systems, with thermally broken frames complying with applicable codes and criteria including UFC 4-010-01. Curtain wall systems shall be capable of

withstanding area wind loads, thermal and structural movement required by location and project requirements, and shall comply with applicable codes and criteria including UFC 4-010-01. Window sills shall be designed to discourage bird nesting.

3.4.3.7. Exterior Louvers: Exterior louvers shall have bird screens and shall be designed to exclude wind-driven rain. Exterior louvers shall be made to withstand wind loads in accordance with the applicable codes. Wall louvers shall bear the Air Movement & Control Association (AMCA) International certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511. Louver finish shall be factory applied and color shall match adjacent finish.

3.4.4. Interior Design Objectives

Provide sustainable materials and furnishings that are easily maintained and replaced. Maximize use of daylighting. Provide interior surfaces that are easy to clean and light in color. Design WTUAS building(s) with an office ambience.

3.4.4.1. Not Used

3.4.4.2. Bulletin Boards: Provide one bulletin board near the main entrance. Each bulletin board shall be 4 feet high and 6 feet wide and shall have a header panel and lockable, glazed doors.

3.4.4.3. Corner Guards: Provide surface mounted, high impact resistant, integral color, snap-on type resilient corner guards, extending from floor to ceiling for wall and column outside corners in high traffic areas such as corridors, waiting areas, lobbies, conference and multi-purpose rooms. Factory fabricated end closure caps shall be furnished for top and bottom of surface mounted corner guards.

3.4.4.4. Chair Rail: Chair rails shall be installed in areas prone to hi-impact use, such as corridors, waiting areas, lobbies, conference and multi-purpose rooms.

3.4.4.5. Casework: Provide cabinets complying with Architectural Woodwork Institute Quality Standards. Countertops shall have waterfall front edge and integral coved backsplash.

3.4.4.6. Fire Extinguisher Cabinets: Furnish and install fire extinguisher cabinets and mounting brackets as required by applicable codes and criteria.

3.4.4.7. Interior Doors and Frames:

(1) Provide hollow metal doors, or flush solid core wood doors as required. All door frames shall be hollow metal.

(2) Wood Doors: All doors shall be wood doors except noted otherwise Provide flush solid core wood doors conforming to WDMA I.S.-1A. Stile edges shall be non-finger jointed hardwood compatible with face veneer. Provide Architectural Woodwork Institute (AWI) Grade A hardwood face veneer for transparent finished doors.

(3) Insulated Hollow Metal Doors: Comply with ANSI A250.8/SDI 100. Doors shall be minimum Level 2, physical performance Level B, Model 2; factory primed. Provide insulated hollow metal doors for utility rooms, storage rooms and bathrooms.

(4) Hollow Metal Frames: Comply with ANSI A250.8/SDI 100. Frames shall be minimum Level 2, 16 gauge, with continuously welded mitered corners and seamless face joints; factory primed.

(5) Fire-rated and Smoke Control Doors and Frames: Comply with applicable codes, criteria and requirements of labeling authority.

(6) STC ratings shall be of the sound classification required and shall include the entire door and frame assembly.

3.4.4.8. Window Treatment: Provide horizontal mini blinds at all exterior windows. Uniformity of window covering color and material shall be maintained to the maximum extent possible throughout each building.

3.4.4.9. Toilet Accessories: Furnish and install the items listed below and all other toilet accessories necessary for a complete and usable facility. All toilet accessories shall be Type 304 stainless steel with satin finish.

- (a) Public Toilets/Showers: Accessories shall include the following items.
 - (1) Glass mirrors on stainless steel frame and shelf – at each lavatory
 - (2) Liquid soap dispenser – at each lavatory
 - (3) Combination recessed mounted paper-towel dispenser/waste receptacle
 - (4) Sanitary napkin disposal at each female toilet/unisex toilet
 - (5) Recessed mounted lockable double toilet paper holder – at each water closet
 - (6) Sanitary toilet seat cover dispenser – one per toilet
 - (7) Grab bars – as required by ABAAG
 - (8) Shower curtain rod - curved extra heavy duty
 - (9) Shower curtain – white anti-bacterial nylon/vinyl fabric shower curtain shall completely close the shower stall width.
 - (10) Soap dish – built-in in shower
 - (11) Robe hook – adjacent to shower stall entry
- (b) Not Used
- (c) Public Toilets: Toilet accessories shall conform to the requirements of the ABA and shall include, but are not limited to the following.
 - (1) Glass mirrors on stainless steel frame and shelf – at each lavatory
 - (2) Liquid soap dispenser – at each lavatory
 - (3) Combination recessed mounted paper-towel dispenser/waste receptacle
 - (4) Sanitary napkin disposal at each female toilet/unisex toilet
 - (5) Recessed mounted lockable double toilet paper holder – at each water closet
 - (6) Sanitary toilet seat cover dispenser – one per toilet
 - (7) Grab bars – as required by ABAAG
 - (8) One Wall-mounted Diaper Changing Station

3.4.4.10. Mold and Mildew Mitigation: The Designer of Record shall provide details in the design analysis and design showing steps taken to mitigate the potential growth of mold and mildew in the facility.

3.4.5. Finishes: Finishes Designers are not limited to the minimum finishes listed in this paragraph and are encouraged to offer higher quality finishes

3.4.5.1. Minimum Paint Finish Requirements

- (a) All paints used shall be listed on the "Approved product list" of the Master Painters Institute, (MPI). Application criteria shall be as recommended by Master Painters Institute (MPI) guide specifications for the substrate to be painted and the environmental conditions existing at the project site.
- (b) Exterior surfaces, except factory pre-finished material or exterior surfaces receiving other finishes shall be painted a minimum of one prime coat and two finish coats. Paints having a lead content over 0.06 percent by weight of nonvolatile content are unacceptable. Paints containing zinc-chromate, strontium-chromate, mercury or mercury compounds, confirmed or suspected human carcinogens shall not be used on this project. Exterior paints and coating products shall be classified as containing low volatile organic compounds (VOCs) in accordance with MPI criteria. Application criteria shall be as recommended by MPI guide specifications. Provide an MPI Gloss Level 5 Finish (Semi-gloss), unless otherwise specified.
- (c) Interior surfaces, except factory pre-finished material or interior surfaces receiving other finishes shall be painted a minimum of one prime coat and two finish coats. Paints having a lead content over 0.06 percent by weight of nonvolatile content are unacceptable. Paints containing zinc-chromate, strontium-chromate, mercury or mercury compounds, confirmed or suspected human carcinogens shall not be used on this project. Interior paints and coating products shall contain a maximum level of 150 g/l (grams per liter) of volatile organic compounds

(VOCs) for non-flat coatings and 50 g/l of VOCs for flat coatings. Provide an MPI Gloss Level 5 Finish (Semi-gloss) in wet areas and a flat finish in all other areas.

3.4.5.2. Minimum Interior Finishes

(a) Designers are not limited to finishes listed in the following INTERIOR FINISHES table(s) and are encouraged to offer higher quality finishes.

(b) Wall, ceiling and floor finishes shall conform to the requirements of the IBC, NFPA and UFC 3-600-01. Where code requirements conflict, the most stringent code requirement shall apply.

(c) Carpet shall be minimum of 2 yarn ply, modular tile conforming to ISO 2551, ASTM D 418, ASTM D 5793, ASTM D 5848, solution dyed, tufted, cut and loop pile, commercial 100% branded (federally registered trademark) nylon continuous filament. Vinyl composition tile (VCT) shall be minimum 1/8 inch thick, conforming to ASTM F 1066, Class 2, through pattern tile, Composition 1, asbestos free, with color and pattern uniformly distributed throughout the thickness of the tile.

(d) Walls: All gypsum board shall achieve a score of 10, the highest level of performance for mold resistance under the ASTM D 3273 test method. All gypsum board shall be transported, handled, stored and installed in accordance with the GYPSUM ASSOCIATION – Guidelines For Prevention Of Mold Growth On Gypsum Board (GA-238-03). Use impact resistant gypsum board in corridors, storage rooms, stairwells and activity rooms and centralized laundries (if centralized laundries are required by RFP).

(e) Ceiling: All gypsum board shall achieve a score of 10, the highest level of performance for mold resistance under the ASTM D 3273 test method. All gypsum board shall be transported, handled, stored and installed in accordance with the GYPSUM ASSOCIATION – Guidelines For Prevention Of Mold Growth On Gypsum Board (GA-238-03).

3.4.5.3. Not Used

3.4.5.4. CoHQ Interior Finishes

CoHQ INTERIOR FINISHES																	
	FLOORS						BASE			WALLS				CEILING			REMARKS
	RESILIENT FLOORING	PORCELAIN OR QUARRY TILE	CERAMIC TILE	RECESSED ENTRY MAT	SEALED CONCRETE	CARPET	RESILIENT BASE	PORCELAIN OR QUARRY BASE	CERAMIC BASE	GYPSUM WALL BOARD-PAINT	LAMINATED GLASS, INSUL. CURTAIN WALL SYSTEM	CERAMIC TILE	LAMINATED GLASS, INSUL. STORE FRONT SYSTEM	GYPSUM WALL BOARD-PAINT	ACOUSTICAL CEILING TILE	MINIMUM HEIGHT 8'-0" UNLESS STATED OTHERWISE	REFER TO NOTE
COMMANDER						●	●			●					●		NOTE 5
EXECUTIVE OFFICER						●	●			●					●		NOTE 5
SUPERVISORY CASE MANAGER						●	●			●					●		NOTE 9
CASE MANAGER						●	●			●					●		
FIRST SERGEANT						□	●			●					●		NOTE 5
PLATOON SERGEANT	□						●			●					●		
SQUAD LEADER	□						●			●					●		
SOCIAL WORKER						□	●			●					●		NOTE 5
NURSE CASE MANAGER						□	●			●					●		NOTE 5
EXTRA OFFICE						□	□			□					□		NOTE 8
OPEN OFFICE AREA	●						●			●					●	9'	

COPIER AND FAX	•						•			•					•		
KITCHENETTE	•						•			•					•		NOTE 3 AND 4
RECORDS ROOM	•						•			•					•		
CONFERENCE ROOM						□	□										NOTE 5
SUPPLY ROOM	□						□										
RECEPTION/WAITING ROOM		□						□		□					□	9'	
MESSAGE CENTER	□						□			□					□		
STORAGE ROOM	□						□			□					□		NOTE 10
MEN'S RESTROOM			•						•	•		•		•			NOTE 1 AND 3
WOMEN'S RESTROOM			•						•	•		•		•			NOTE 1 AND 3
JANITOR CLOSET			•						•	•		•		•			NOTE 2
CORRIDORS	□						□			•				•		9'	
VESTIBULES		•		•				•		•	□		•	•		9'	
STAIRS	□				□		□			□				□			NOTE 7
ELEVATOR		□						□		□					□		NOTE 11
PUMP ROOM					□		□			□				□			NOTE 11
MECHANICAL				•		•			•					•			NOTE 6
ELECTRICAL				•		•			•					•			NOTE 6
TELECOMM					•		•			•					•	10'	

1. ALL WET WALLS IN TOILET ROOMS SHALL HAVE 4'-0" HIGH CERAMIC TILE WAINSCOT. ALL SHOWERS SHALL HAVE FULL HEIGHT TILE WALLS.
2. WALLS ADJACENT TO JANITOR'S SINK SHALL HAVE A 4'-0" HIGH CERAMIC TILE WAINSCOT.
3. ALL COUNTERS SHALL HAVE A MINIMUM OF 4" HIGH BACKSPLASH.
4. IN VENDING OR RECYCLABLES STORAGE AREA, MATCH FLOORING, WALL, AND CEILING FINISHES TO THOSE OF ADJACENT AREA.
5. EXTEND PARTITIONS TO DECK. PROVIDE SOUND INSULATION TO MEET A MINIMUM RATING AT DOORS AND WALLS OF STC 49.
6. CEILING MAY BE PAINTED EXPOSED STRUCTURE IF ALLOWED BY APPLICABLE CODE.
7. RISERS SHALL BE PAINTED STEEL. STAIR LANDINGS AND TREADS SHALL HAVE RESILIENT FLOORING OR SEALED CONCRETE. PROVIDE TREADS WITH SLIP RESISTANT NOSING.
8. ONLY USED ON SMALL CoHQ
9. USED ON ALL MEDIUM AND LARGE CoHQs.
10. ONLY USED ON MEDIUM DUPLEX CoHQ.
11. USED ONLY ON MEDIUM STACKED AND LARGE STACKED CoHQs.

3.4.5.5. Not Used

3.4.5.6. SFAC Interior Finishes

Finishes shall be coordinated through the United States Army Corps of Engineers Center of Standardization to ensure use of therapeutic colors, flooring material, and countertop textures.

The Contact address is:
 Corps of Engineers – Ft Worth District
 CESWF-EC-DA
 819 Taylor Street
 Room 4A05
 Fort Worth, TX 76102

SFAC INTERIORS FINISHES

	FLOORS	BASE	WALLS	CEILING	REMARKS
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	RESILIENT FLOORING	PORCELAIN TILE	RUBBER FLOORING	RECESSED ENTRY MAT	SEALED CONCRETE	CARPET	RESILIENT BASE	WOOD BASE	CERAMIC BASE	GYPSUM WALL BOARD - PAINT	WOOD VENEER WALL COVERING	CERAMIC TILE	VEENER STONE WALL FINISH	LAMINATED GLASS, INSUL. STORE FRONT SYSTEM	GYPSUM WALL BOARD - PAINT	ACOUSTICAL CEILING TILE	LAY-IN WOOD TILE	MINIMUM-HEIGHT 8'-0" UNLESS STATED OTHERWISE	REFER TO NOTE
PUBLIC & SUPPORT SPACES																			
RECEPTION AREA						•	•			•	•		•		•	•	•		
PUBLIC COMPUTER ACCESS						•	•			•						•			
MULTI-USE/CONFERENCE ROOM W/STORAGE						•	•			•					•	•			
NOURISHMENT CENTER		•						•		•					•				
CHILD ACTIVITY ROOM	•		•				•			•					•	•			
STORAGE ROOM						•	•			•					•				
MEN'S RESTROOM		•							•			•			•				
WOMEN'S RESTROOM		•							•			•			•				
TOILET		•							•			•			•				
JANITOR CLOSET		•							•	•		•			•				NOTE 5
MECHANICAL					•		•			•					•				NOTES 3 & 4
ELECTRICAL					•		•			•					•				NOTES 3 & 4
TELECOMM					•		•			•					•			10'	
CAM ROOM					•		•			•					•				
ADMINISTRATIVE OFFICES																			
DIRECTOR						•	•			•						•			
FAMILY SUPPORT						•	•			•						•			
DISTRIBUTION CENTER						•	•			•						•			
STORAGE ROOM						•	•			•					•				
SOCIAL SERVICES ASST.						•	•			•						•			
VOLUNTEER						•	•			•						•			NOTE 1
CHAPLAIN						•	•			•						•			
TRANSITIONAL EMPLOYMENT						•	•			•						•			NOTE 2
DFAS						•	•			•						•			NOTE 2
DFAS/TRANSITIONAL EMPLOYMENT						•	•			•						•			
MILITARY BENEFITS/ID PROCESSING						•	•			•						•			
MILITARY BENEFITS						•	•			•						•			NOTE 2
EDUCATION						•	•			•						•			
VA						•	•			•						•			NOTE 2
TSGLI						•	•			•						•			NOTE 2

AW2						•	•			•						•			NOTE 2
OUTREACH						•	•			•						•			NOTE 2
ACS I & R (INFO EXPL)						•	•			•						•			NOTE 2
FINANCIAL COUNSEL						•	•			•						•			NOTE 2
ADMINISTRATIVE OPEN OFFICES																			
NCOIC						•	•			•						•			NOTE 2
ADMINISTRATION						•	•			•						•			NOTE 2
LEGAL						•	•			•						•			NOTE 2
C & Y SERVICES						•	•			•						•			NOTE 2
CPAC						•	•			•						•			NOTE 2
VOLUNTEER						•	•			•						•			NOTE 2
OPEN						•	•			•						•			NOTE 2

Notes:

1. ONLY USED IN SMALL SFAC
2. ONLY USED IN LARGE SFAC
3. WALL PAINT TO BE WATER-BASED EPOXY
4. CEILINGS MAY BE PAINTED EXPOSED STRUCTURE IF ALLOWED BY APPLICABLE CODE
5. WALLS ADJACENT TO JANITOR'S SINK SHALL HAVE A 4"-0" HIGH CERAMIC TILE WAINSCOT

3.4.5.7. Not Used

3.4.5.8. Not Used

3.4.5.9. CoHQ Furniture Chart

CoHQ FURNITURE CHART		
Description	Comments	Furniture Required
Commander	Private Office	U-shaped executive desk with 2 pedestals, hutch, one 4-drawer lateral file, 2 guest chairs, 1 executive chair
Executive Officer	Private Office	L-shaped double pedestal desk unit, hutch, one 4-drawer lateral file, 2 guest chairs, 1 task chair
First Sergeant	Private Office	L-shaped double pedestal desk unit, hutch, two 4-drawer lateral files, 2 guest chairs, 1 executive chair
Office 1 (See note 1)	Private Office	L-shaped double pedestal desk unit, hutch, two 4-drawer lateral files, 2 guest chairs, 1 task chair
Platoon Sergeant	Shared Office	2 L-shaped modular furniture workstations with work surfaces, file pedestals, and overhead storage, one 4-drawer lateral files, 2 task chairs, 2 guest chairs
Squad Leaders	Shared Office	3 single pedestal desks, 3 task chairs, 3 guest chairs
Open Office (See note 2)	48 NSF Open Workstations	6 x 8 systems furniture workstation with work surfaces, file pedestals, and overhead storage, 1 task chair, 1 guest chair, room enough for wheelchair access into cubical
Conference Room	Commander's Conference Room	Boat-shaped conference table, 12 conference chairs, minimum of 4 side chairs, 1 small storage credenza
Copier and Fax	Copy Room with Fax Machine	1 work surface with storage for paper

CoHQ FURNITURE CHART		
Description	Comments	Furniture Required
Records Room	Storage	Minimum of five 4-drawer lateral files
Supply Room	Storage	Minimum of 80 linear feet of shelving, Minimum of 1 locking cabinet
Reception/Waiting Room	Building Reception and Waiting Area	1 reception station with task chair(s), minimum of 10 lobby seats with side tables.

Notes:

(1) Office 1 layout applies to Case manager, Nurse Case manager, Social Worker, Extra Office and Supervisor Case Manager.

(2) Open Office workstations apply to Occupational Therapy Assistant, Medical NCO, Financial Tech. Specialist, Training Specialist, Medical Support Assistant, Supply Technician, HR Specialist, HR Assistant and Family Readiness Support Assistant.

3.4.5.10. Not Used

3.4.5.11. SFAC Furniture Chart

SFAC FURNITURE CHART (See note 1)		
Description	Comments	Furniture Required
Office (See note 2)	Private Office	L-shaped systems furniture workstation with 1 pedestal, one 2-drawer lateral file, 2 guest chairs, 1 executive chair
Open Office-Large Only (See note 3)	48 NSF Open Workstations	6 x 8 systems furniture workstation with work surfaces, 2 file pedestals, and overhead storage, 1 task chair, 1 guest chair, room enough for wheelchair access into cubical
Family Support-Small	Private Lounge	One 3-seat upholstered arrangement, one 2-seat upholstered arrangement, 1 upholstered chair, 1 side table, 1 computer table
Family Support-Large	Private Lounge	One 3-seat upholstered arrangement, one 2-seat upholstered arrangement, 2 upholstered chairs, 2 side tables, 1 computer table
Nourishment Center-Small	Food prep area	3 round tables, 6 chairs
Nourishment Center-Large	Food prep area	3 round tables, 10 chairs
Multi-Use/Conference Room-Small	Conference Room	Six 30"x60" training tables, 16 conference chairs, one 24"x75" credenza
Multi-Use/Conference Room-Large	Conference Room	Eight 30"x60" training tables, 20 conference chairs, one 24"x75" credenza
Reception Area-Small	Reception/waiting/dining	Two 3-seat upholstered arrangement, one 2-seat upholstered arrangement, 5 upholstered chairs, 4 side tables, 2 sofa tables, 1 coffee table, 3 round dining tables, 6 dining chairs, U-shaped reception station with work surface, 2 file pedestals, and overhead storage, transaction top, 2 task chairs.

SFAC FURNITURE CHART (See note 1)		
Description	Comments	Furniture Required
Reception Area-Large	Reception/waiting/dining	Two 3-seat upholstered arrangement, two 2-seat upholstered arrangement, 15 upholstered chairs, 11 side tables, 1 sofa table, 3 round dining tables, 10 dining chairs, L-shaped reception station, with work surface, 2 file pedestals, and overhead storage, transaction top, 2 task chairs.
Public Computer Access	Computer Room	6 task chairs
Courtyard-Small	Open-air dining	7 round tables, 28 chairs
Courtyard-Large	Open-air dining	10 round tables, 29 chairs
General Storage-Small	Storage	Minimum of 162 total linear feet of wire shelving; two 5-high lateral file cabinets and 1 lockable storage cabinet for main storage
General Storage-Large	Storage	Minimum of 90 total linear feet of wire shelving; two 5-high lateral file cabinets and 2 lockable storage cabinets for main storage
Distribution Center-Small	Storage	Minimum of 54 linear feet of wire shelving, two 5-drawer lateral file cabinets, 1 locking cabinet
Distribution Center-Large	Storage	Minimum of 90 linear feet of wire shelving, 3 locking storage cabinets, three 5-drawer lateral file cabinets, two 36" x 60" tables

- (1) Coordination with drawings necessary to verify room list per building.
- (2) Office layout applies to all hard wall offices. Coordinate with drawings, can include the following: Director, Family Support, Distribution Center, General Storage, Social Services Assistant, Volunteer, Pastoral, Transition Employment, DFAS, DFAS/Transition Employment, Military Benefits/ID Processing, Military Benefits, Education, VA, TSGLI, AW2, ACS I&R (Reception), ACS I & R (Info Expl) and/or Financial Counsel.
- (3) Open Office workstations apply to NCOIC, Administration, Legal, C&Y Services, CPAC, two Volunteers and Open.

3.5. STRUCTURAL REQUIREMENTS

Design and construct as a complete system in accordance with APPLICABLE CRITERIA.

3.5.1. Live Loads: Design live loads shall be per the IBC but not lower than the following minimums:

- (a) Elevated slabs 60 pounds per square foot (psf)
- (b) Slabs on grade 150 psf
- (c) Centralized laundry area 150 psf, but not less than actual equipment loads

3.6. MECHANICAL REQUIREMENTS

3.6.1. Plumbing

3.6.1.1. Not Used

3.6.1.2. Not Used

3.6.1.3. Not Used

3.6.1.4. Not Used

3.6.1.5. Not Used

3.6.1.6. WTUAS - Urinals shall be non-water using (waterless, water-free, etc.) type or shall be ultra-low flow type using less than 0.2 gallons per flush.

3.6.1.7. SFAC - Provide sink for built-in diaper changing station with goose neck faucet and wrist blade handles.

3.6.1.7.1. For Child Activity Room pre-toddler/toddler toilet area, provide one pediatric water closet (10 inches to rim above finished floor (AFF)). Water closet shall not use automatic flush valve. Provide floor drain in toilet area. Provide one wall hung child size lavatory mounted 17 inches AFF. Lavatory shall be mounted opposite from water closet. Provide one bubbler water fountain, with guarded stream drinking head, outside pre-toddler/toddler toilet area. Bubbler shall be mounted 17 inches AFF.

3.6.1.7.2. Not Used

3.6.1.7.3. Not Used

3.6.1.8. Not Used

3.6.2. Heating, Ventilating and Air-Conditioning (HVAC)

3.6.2.1. Not Used

3.6.2.2. Not Used

3.6.2.3. Not Used

3.6.2.4. Not Used

3.6.2.5. Not Used

3.6.2.6. WTUAS or SFAC - All air handling units shall be located in mechanical rooms accessible only through an exterior door. Mechanical rooms shall be sized for ease of service, maintenance, and replacement of HVAC equipment. Air filters shall be located in the mechanical room. Occupant control shall also include ability to select heating or cooling mode. HVAC system shall be able to provide for year round heating.

Each conference and multi-purpose room shall be zoned separately. Other space zoning shall be based on exterior envelope exposures. Where VAV systems are used, limit individual zones to a maximum of 2,500 cfm.

Air handling units shall run continuously during occupied hours. Restroom exhaust fans shall be interlocked with the air handling units. Similarly, outdoor ventilation air required by ASHRAE 62.1 shall be continuous during occupied hours.

3.6.2.7. SFAC - Provide continuous exhaust above diaper changing station at a rate of 100-150 cfm.

3.6.2.8. Not Used

3.6.3. Fire Protection

Fire suppression systems shall be designed in accordance with the latest edition of UFC 3-600-01. All facilities as a part of the complex shall be protected throughout by a complete automatic sprinkler system.

3.6.4. COMPLIANCE WITH ENERGY POLICY ACT OF 2005 (EPACT 2005)

3.6.4.1. EPACT 2005 Requirement

The building, including the building envelope, HVAC systems, service water heating, power, and lighting systems shall be designed to achieve an energy consumption that is at least 30% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1-2004 (see paragraph 5.9 Energy Conservation)

3.6.4.2. Prescriptive Path (Use of Technology Solution Set)

The technology solution set shown in the table below achieves the above energy performance and life cycle cost effectiveness requirements for a WT facility in the indicated DOE climatic zone.

Climate Zone 4A, Prescriptive Technology Solution Table

Item	Component	30% Solution
Roof	Attic	R-50
	Surface reflectance	0.27
Walls	Light Weight Construction	R-20
Exposed Floors	Mass	R-20
Slabs	Unheated	NR ⁽²⁾
Doors	Swinging	U-0.70
	Non-Swinging	U-1.45
Infiltration		0.25 cfm/ft ² @ 75 Pa ⁽³⁾
Vertical Glazing	Window to Wall Ratio (WWR)	10% - 20%
	Thermal transmittance	U-0.45
	Solar heat gain coefficient (SHGC)	0.31
Interior Lighting	Lighting Power Density (LPD)	0.9 W/ft ²
	Ballast	Electronic ballast
HVAC	Air Conditioner	4-Pipe Fan Coil with central chiller and boiler plus DOAS ⁽⁴⁾ with 14.0 SEER DX coil (3.52 COP) and HHW coil on central boiler SAT control 55°F – 62°F with OAT 75° – 54°F
	Gas Furnace	none
	ERV	70% - 75% sensible effectiveness
Economizer		no
Ventilation	Outdoor Air Damper	Motorized control
	Demand Control	NR
	Laundry Room	Decoupled ⁽⁵⁾
Ducts	Friction Rate	0.08 in. w.c./100 feet
	Sealing	Seal class B
	Location	Interior only
	Insulation level	R-6 ⁽⁶⁾
Service Water Heating	Gas storage	90% E _t

Notes for Prescriptive Technology Solution Table:

(1) NOT USED

- (2) NR means there is no requirement or recommendation for a component in this climate.
- (3) Increased Building Air tightness. Building air leakage (measured in cfm/ft²) is the average volume of air (measured in cubic feet per minute) that passes through a unit area of the building envelope (measured in square feet) when the building is maintained at a specified internal pressure (measured in Pascals). Testing requirements are specified in Chapter 5..
- (4) Dedicated Outdoor Air System. A central dedicated outdoor air system (DOAS) providing the following:
- (a) Outside air for building indoor air quality and humidity control
 - (b) Make-up air for bathroom and kitchen exhausts
 - (c) Building pressurization to prevent infiltration which allows for reduction of heating/cooling and moisture loads on the system.

NOTE: The Central DOAS does not provide sensible heating or cooling. Sensible loads are provided by a complementing heating and cooling system

(5) **Decoupling exhaust and supply systems for laundry rooms.** To reduce unneeded energy use for heating and cooling of the make-up air and for air transportation of supply and exhausted air from the dryers, laundry exhaust and supply systems are separated in the efficient building model from the rest of the building exhaust and supply systems. Laundry exhaust system and corresponding make-up systems operate only when dryers are operating.

(6) The duct and pipe insulation values are from the ASHRAE Advanced Energy Design Guide for Small Offices.

All design features of this EPACK 2005 compliant UEPH not described above will be in accordance with the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1-2007, including conformance with paragraph 5.9.2, which requires purchase of Energy Star and FEMP designated products.

3.6.4.3. Compliance Path

When the "Compliance Path" is selected, the facility design shall include a uniquely developed technology solution set which can be shown by the design analysis (using facility energy simulation software) not to exceed the target energy consumption budget stated in 3.6.2 above and meet all the criteria in the DOE interim final rule: "Energy Conservation Standards for New Federal Commercial and Multi-Family High-Rise Residential Buildings and New Federal Low-Rise Residential Buildings".

3.6.4.4. Schedules

If a unique technology solution set method of compliance is chosen then the following facility schedules must be used in all facility energy simulations for purposes of showing compliance with 3.6.4. Additionally, for simulation of a baseline building model, the "baseline values" for each component shall be as per ASHRAE Standard 90.1-2004 Building Envelope Requirements table for applicable climate zone and residential construction.

WT Common Area Internal Load Schedules

Hr	Occupancy			Lighting			Washer/Dryer Use			Washer SHW		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1-6	0.00	0.00	0.00	0.30	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00
7-10	0.20	0.20	0.20	0.30	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00
11-18	0.00	0.00	0.00	0.30	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.80	0.80	0.80	0.00	0.00	0.00	0.00	0.00	0.00
20-21	0.20	0.20	0.20	0.80	0.80	0.80	0.50	0.50	0.50	0.50	0.50	0.50
22-23	0.40	0.40	0.40	0.80	0.80	0.80	1.00	1.00	1.00	1.00	1.00	1.00
24	0.20	0.20	0.20	0.80	0.80	0.80	0.50	0.50	0.50	0.50	0.50	0.50
Peak	5 occ/floor			1.0 W/ft ² (10.8 W/m ²)			8.4 kW/floor			53.3 gal/hr/flr (202 L/hr/flr)		

WT Apartment Unit Internal Load Schedules

Hr	Occupancy			Lighting			Plug Loads			Service Hot Water		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1-5	0.80	0.75	0.75	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.00
6	0.70	0.65	0.75	0.40	0.30	0.20	0.20	0.20	0.20	0.10	0.10	0.10
7	0.60	0.60	0.70	0.70	0.50	0.30	0.40	0.35	0.20	0.40	0.40	0.40
8	0.50	0.50	1.00	0.50	0.50	0.50	0.40	0.40	0.40	0.20	0.20	0.20
9	0.25	0.25	0.00	0.20	0.20	0.20	0.30	0.40	0.40	0.00	0.00	0.00
10-17	0.20	0.20	0.20	0.20	0.20	0.20	0.30	0.30	0.30	0.00	0.00	0.00
18	0.30	0.30	0.30	0.50	0.50	0.50	0.50	0.50	0.50	0.10	0.10	0.10
19	0.50	0.30	0.30	0.70	0.70	0.70	0.50	0.50	0.50	0.10	0.10	0.10
20	0.50	0.50	0.50	0.70	0.70	0.70	0.60	0.50	0.50	0.10	0.10	0.10
21	0.70	0.50	0.50	0.70	0.70	0.70	0.60	0.50	0.50	0.00	0.00	0.00
22	0.70	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.00	0.00	0.00
23	0.80	0.75	0.75	0.40	0.40	0.40	0.40	0.50	0.50	0.00	0.00	0.00
24	0.80	0.75	0.75	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.00
Peak	2 occ/unit			1.1 W/ft ² (10.8 W/m ²)			1.7 W/ft ² (18 W/m ²)			40 gal/hr (114 L/hr)		

WT Apartment Unit Internal Load Schedules

Hr	Refrigerator			Range and Oven		
	Wk	Sat	Sun	Wk	Sat	Sun
1-6	1.00	1.00	1.00	0.01	0.01	0.01
7-16	1.00	1.00	1.00	0.04	0.04	0.04
17-18	1.00	1.00	1.00	0.05	0.05	0.05
19-20	1.00	1.00	1.00	0.11	0.11	0.11
21-23	1.00	1.00	1.00	0.10	0.10	0.10
24	1.00	1.00	1.00	0.03	0.03	0.03
Peak	76.36 W/unit			68.95 W/unit		

WT Apartment Unit Thermostat Set-Point Schedules

Hr	Heating (°F)			Heating (°C)			Cooling (°F)			Cooling (°C)		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1-24	68	68	68	20	20	20	75	75	75	24	24	24

WT Unoccupied Zones (ie stairwells, mechanical rooms) Thermostat Set-Point Schedules

Hr	Heating (°F)			Heating (°C)		
	Wk	Sat	Sun	Wk	Sat	Sun
1-24	55	55	55	12.8	12.8	12.8

3.7. ELECTRICAL AND TELECOMMUNICATIONS REQUIREMENTS

Select electrical characteristics of the power system to provide a safe, efficient, and economical distribution of power based upon the size and types of loads to be served. Use distribution and utilization voltages of the highest level that is practical for the load to be served. The effect of nonlinear loads such as computers, other electronic equipment and electronic ballasts shall be considered and accommodated as necessary. Voltage drop shall not

exceed the maximum allowed per ASHRAE 90.1. Transient voltage surge protection shall be provided on service equipment for WT Barracks, WTUASs, and SFACs.

3.7.1. Power

3.7.1.1. Power shall be provided for all installed equipment requiring power including all government furnished contractor installed equipment and all GFGI equipment. Power poles are not allowed. The following shall also be provided.

3.7.1.1.1. Provide 125-volt duplex receptacles per NFPA 70, in conjunction with the proposed equipment and furniture layouts, and as per other stated requirements elsewhere in the RFP.

3.7.1.1.2. Each CATV outlet shall have a 125-volt duplex receptacle mounted adjacent to it.

3.7.1.1.3. In addition to receptacles required elsewhere in the statement of work provide one 125-volt duplex receptacle per wall in all normally occupied spaces with the exception of WT barracks dwelling units.

3.7.1.1.4. For housekeeping purposes provide a minimum of one 125-volt duplex receptacle per corridor. No point along corridor wall bottom shall be more than 25 feet from a receptacle.

3.7.1.1.5. Provide 125-volt duplex receptacles adjacent to lavatories. Provide a minimum of one for every two adjacent lavatories. Each single lavatory shall also be provided a receptacle.

3.7.1.1.6. Provide a minimum of two 125-volt duplex receptacles in each mechanical room in addition to those required per NFPA 70. In addition, provide a minimum of one receptacle in each electrical room.

3.7.1.2. Not Used

3.7.1.3. WTUAS

3.7.1.3.1. Provide a minimum of two 125-volt duplex receptacles for each designated individual work space (cubicle) in all open office areas. One of which shall be adjacent to the telecommunications outlet.

3.7.1.3.2. Provide two 125-volt duplex receptacles for the CQ workstation adjacent to the telecommunications outlet. Receptacles shall be on a dedicated circuit.

3.7.1.3.3. For housekeeping purposes provide a minimum of one 125-volt duplex receptacle on each wall within reception/waiting room. No point along bottom of walls shall be more than 25 feet from a receptacle.

3.7.1.3.4. Provide a 125-volt duplex receptacle above countertop on either side of the sink in kitchenette. These two receptacles shall be on a dedicated circuit. All remaining receptacles in room shall be on another dedicated circuit.

3.7.1.3.5. Not Used

3.7.1.4. SFAC

3.7.1.4.1. Provide a 125-volt duplex receptacle adjacent to each data outlet in public computer access rooms.

3.7.1.4.2. Provide 125-volt duplex receptacles above countertop in nourishment center and child activity room such that no point along countertop is more than 4 feet from a receptacle. In addition, provide a 125-volt duplex receptacle above sign-in countertop in child activity room and above shelf for microwave in Nourishment Center. Receptacles above countertop and above shelf in Nourishment Center shall be on a dedicated circuit.

3.7.1.4.3. Provide two 125-volt duplex receptacles for the reception station adjacent to the telecommunications outlet. Receptacles shall be on a dedicated circuit.

3.7.1.4.4. Provide a minimum of four 125-volt duplex receptacles in courtyard area evenly spaced along perimeter walls.

3.7.1.4.5. Provide a minimum of two 125-volt duplex receptacles in the courtyard mounted at eave height for decorative lighting.

3.7.1.4.6. For housekeeping purposes provide a minimum of one 125-volt duplex receptacle on each wall within reception area. No point along bottom of reception area perimeter walls shall be more than 25 feet from a receptacle.

3.7.1.4.7. Provide a minimum of five 125-volt duplex receptacles along the wall in the older children's area within the child activity room. Mount receptacles 54 in. above finished floor. Locate each receptacle adjacent to a telecommunications outlet.

3.7.1.4.8. Provide a 125-volt duplex receptacle adjacent to the fireplace in the reception area in addition to the requirement stated in paragraph 3.7.1.4.6

3.7.1.4.9. Provide two 125-volt quadraplex receptacles on the back wall of the cam room mounted 36 in. above finished floor. Receptacles shall be on a dedicated circuit.

3.7.1.4.10. Not Used

3.7.1.4.11. Provide a minimum of four floor recess mounted 125-volt duplex receptacles in the reception area. Receptacle locations shall be coordinated with the furniture layout and placement finalized during design.

3.7.1.4.12. In addition to the receptacles required per the Technical Criteria for I3A in the distribution center, provide two dedicated circuits with a single power receptacle connected to each for copiers. Power requirements for these circuits will not be known until a copier is selected by the Installation during the design phase.

3.7.1.4.13. Provide two 125-volt duplex receptacles in the storage room behind the reception counter and in the storage room adjacent to the AW2 office. Receptacles shall be placed on opposite walls and located adjacent to a dual jack telecommunications outlet.

3.7.1.5. Not Used

3.7.2. Grounding

Provide grounding in accordance with NFPA 70 and the Technical Criteria for I3A.

3.7.3. Lighting

3.7.3.1. General.

3.7.3.1.1. Provide interior lighting controls in accordance with ASHRAE 90.1.

3.7.3.1.2. Provide an illuminance level of 30 foot-candles in mechanical and electrical rooms.

3.7.3.1.3. Compact fluorescent lamps of 12 watts or less shall not be used.

3.7.3.1.4. Electronic ballasts for linear fluorescent lamps shall be the high efficiency programmed start type.

3.7.3.1.5. Provided lighting levels shall be within +/- 10% of required lighting levels.

3.7.3.2. Not Used

3.7.3.3. WTUAS

3.7.3.3.1. Local manual controls shall supplement automatic controls in restrooms, offices, open work spaces, reception/waiting room, and specialized areas such as conference rooms.

3.7.3.3.2. Provide an illuminance level of 20 foot-candles in the reception and waiting area. Provide an illuminance level of 30 foot-candles on the CQ workstation in the reception/waiting room.

3.7.3.3.3. Provide an illuminance level of 10 foot-candles in supply and records rooms. Provide automatic occupancy sensor detection switching for fixtures.

3.7.3.3.4. Provide an illuminance level of 30 foot-candles in kitchenette. Provide automatic occupancy sensor detection switching for fixtures.

3.7.3.3.5. Not Used

3.7.3.4. SFAC

3.7.3.4.1. Local manual controls shall supplement automatic controls in restrooms, public computer access rooms, offices, reception area; and specialized areas such as multi-use/conference rooms.

3.7.3.4.2. Provide a minimum illuminance level of 1 foot-candle in courtyards. Decorative lighting fixtures are required. If poles are utilized they are not allowed to be over 10 feet tall. Provide manual switching from inside the SFAC.

3.7.3.4.3. Provide an illuminance level of 30 foot-candles in the child activity room. Lighting shall be compatible with security cameras to ensure area covered by each camera can be clearly seen on the reception monitor. Contractor shall coordinate camera type and location with the installation thru the contracting officer's representative.

3.7.3.4.4. Provide an illuminance level of 20 foot-candles in the reception area. Provide an illuminance level of 30 foot-candles on reception station within the reception area.

3.7.3.4.5. Provide an illuminance level of 30 foot-candles in the public computer access room and nourishment center.

3.7.3.4.6. Provide an illuminance level of 10 foot-candles in the distribution center.

3.7.3.4.7. Provide separately switched accent lighting on the interior side of the fireplace.

3.7.3.4.8. Provide an illuminance level of 50 foot-candles in the cam room.

3.7.3.4.9. Provide an illuminance level of 30 foot-candles in the storage room behind the reception counter and in the storage room adjacent to the AW2 office.

3.7.3.5. Not Used

3.7.4. Telecommunications System

3.7.4.1. Provide telecommunications outlets per applicable criteria based on functional purpose of the space within the building and in accordance with other provisions of this RFP. Provide voice and data connection capability to all workstations.

3.7.4.2. Not Used

3.7.4.3. WTUAS

3.7.4.3.1. Provide one dual 8-pin modular jack outlet in the CQ workstation, two in the copier and fax room; one in the message center and one at the front of the conference room.

3.7.4.3.2. Provide a dual 8-pin modular jack outlet at each designated individual work space (cubicle) in the open office area.

3.7.4.4. SFAC

3.7.4.4.1. Provide six single 8-pin modular jack outlets for data connectivity in the public computer access room evenly spaced above counter.

3.7.4.4.2. Provide a dual 8-pin modular jack outlet in the reception station and at the front of the conference/multi-use room.

3.7.4.4.3. Provide a dual 8-pin modular jack outlet above the sign-in countertop in the child activity room. Locate adjacent to duplex receptacle.

3.7.4.4.4. Provide a minimum of five single 8-pin modular jack (data) outlets along the wall in the older children's area within the child activity room. Locate each adjacent to a duplex receptacle.

3.7.4.4.5. Provide necessary LAN connection for kiosk.

3.7.4.4.6. Provide connectivity for two pay phones in vestibule. Coordinate requirements with local private telephone company.

3.7.4.4.7. Provide a minimum of four dual 8-pin modular jack outlets in the distribution center.

3.7.4.4.8. Provide two dual 8-pin modular jack outlets in the storage room behind the reception counter and in the storage room adjacent to the AW2 office. Locate adjacent to a duplex receptacle.

3.7.4.4.9. Not Used

3.7.4.5. Not Used

3.7.5. Video Teleconferencing

Provide an outlet that has both a fiber optic jack and a coaxial jack to provide video teleconferencing connectivity in each conference room. Outlet shall have a 125-volt duplex receptacle mounted adjacent to it in accordance with the Technical Criteria for I3A.

3.7.6. CATV

All CATV outlet boxes, connectors, cabling, and cabinets shall conform to applicable criteria unless noted otherwise. All horizontal cabling shall be homerun from the CATV outlet to the nearest telecommunications room unless noted otherwise. See paragraph 6.0 PROJECT SPECIFIC REQUIREMENTS for possible additional requirements.

3.7.6.1. Not Used

3.7.6.2. WTUAS

3.7.6.2.1. Provide connectivity in conference rooms.

3.7.6.2.2. Provide connectivity in reception/waiting room. Provide a minimum of two outlets.

3.7.6.3. SFAC

3.7.6.3.1. Provide connectivity in multi-use/conference room.

3.7.6.3.2. Provide connectivity in child activity room and reception/waiting room. Provide a minimum of two outlets in each room.

3.7.7. Mass Notification

MNS shall be integrated into the installation's area wide MNS (Giant Voice). See paragraph 6 for possible additional requirements.

3.7.8. Not Used

3.7.9. Observation Cameras Infrastructure (Cameras, CPU's and monitors not in contract)

The infrastructure shall be installed to support GFGI cameras, CPU'S and monitors. Cameras will be installed in child activity room and throughout the playground area to allow for observation of all areas within the room and playground. Cameras will also be installed within all storage areas accessible from within the child activity room. Location of GFGI cameras shall be coordinated with the installation thru the COR and approved by the Family and Morale Welfare and Recreation Command (FMWRC). CPU'S will be located on dedicated equipment racks within the camera room and observation monitors will be located in the reception/waiting room visible to both waiting personnel and the reception desk. A monitor will also be provided in the director's office. Infrastructure shall consist of conduit, pull wire and outlet boxes to allow for interconnection of all system components.

3.7.10. Sound System Infrastructure

Provide speakers, conduit, and wiring for a stand alone sound system within the reception area. Wiring and conduits shall be run back to the reception desk to be connected (by others) to a sound system provided by others. Provide 10' of slack for all wiring.

3.7.11. Audio/Visual System

Provide a dual 8-pin modular jack outlet at the front of each conference room and an empty 1" conduit (with pull wire) above the ceiling from each GFGI ceiling mounted projector location to a wall mounted outlet box located adjacent to the dual jack outlet.

3.8. FIRE ALARM REQUIREMENTS

3.8.1. All software, software locks, special tools and any other proprietary equipment required to maintain, add devices to or delete devices from the system, or test the Fire Alarm system shall become property of the Government and be furnished to the Contracting Officer's Representative prior to final inspection of the system.

3.8.2. The fire alarm system shall be designed by a registered professional Fire Protection Engineer and installation shall be supervised by a National Institute for Certification of Engineering Technologies (NICET) Level 3 (minimum) technician.

3.8.3. Not Used

4.0 APPLICABLE CRITERIA

Unless a specific document version or date is indicated, use criteria from the most current references as of the date of issue of the contract or task order, including any applicable addenda, unless otherwise stated in the task order. In the event of conflict between References and/or Applicable Military Criteria, apply the most stringent requirement, unless otherwise specifically noted in the contract or task order.

4.1. INDUSTRY CRITERIA

Applicable design and construction criteria references are listed in Table 1 below. This list is not intended to include all criteria that may apply or to restrict design and construction to only those references listed. See also Paragraph 3 for additional facility-specific applicable criteria.

Table 1: Industry Criteria

Air Conditioning and Refrigeration Institute (ARI)	
ARI 310/380	Packaged Terminal Air-Conditioners and Heat Pumps
ARI 440	Room Fan-Coil and Unit Ventilator
ANSI/ARI 430-99	Central Station Air Handling Units
ARI 445	Room Air-Induction Units
ARI 880	Air Terminals
Air Movement and Control Association (AMCA)	
AMCA 210	Laboratory Methods of Testing Fans for Rating
American Architectural Manufacturers Association (AAMA)	
AAMA 605	Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
AAMA 607.1	Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
AAMA 1503	Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections
American Association of State Highway and Transportation Officials (AASHTO)	
	Roadside Design Guide [guardrails, roadside safety devices]
	Standard Specifications for Transportation Materials and Methods of Sampling and Testing [Road Construction Materials]

	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals
	Guide for Design of Pavement Structures, Volumes 1 and 2 [pavement design guide]
	A Policy of Geometric Design of Highways and Streets
American Bearing Manufacturers Association (AFBMA)	
AFBMA Std. 9	Load Ratings and Fatigue Life for Ball Bearings
AFBMA Std. 11	Load Ratings and Fatigue Life for Roller Bearings
American Boiler Manufacturers Association (ABMA)	
ABMA ISEI	Industry Standards and Engineering Information
American Concrete Institute	
ACI 302.2R	Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
ACI 318	Building Code Requirements for Structural Concrete
ACI SP-66	ACI Detailing Manual
ACI 530	Building Code Requirements for Masonry Structures
ADA Standards for Accessible Design	
See US Access Board	ADA and ABA Accessibility Guidelines for Buildings and Facilities, Chapters 3-10.
American Institute of Steel Construction (AISC)	
	Manual of Steel Construction – 13 th Edition (or latest version)
American Iron and Steel Institute	
AISI S100	North American Specification for the Design of Cold-Formed Steel Structural Members
American National Standards Institute 11 (ANSI)	

ANSI Z21.10.1	Gas Water Heaters Vol. 1, Storage water Heaters with Input Ratings of 75,000 Btu per Hour or less
ANSI Z124.3	American National Standard for Plastic Lavatories
ANSI Z124.6	Plastic Sinks
ANSI Z21.45	Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
ANSI/IEEE C2-2007	National Electrical Safety Code
ANSI/AF&PA NDS-2001	National Design Specification for Wood Construction
American Society of Civil Engineers (ASCE)	
ASCE 7	Minimum Design Loads for Buildings and Other Structures
ASCE 37	Design and Construction of Sanitary and Storm Sewers, Manuals and Reports on Engineering Practice [sanitary sewer and storm drain design criteria]
ASCE/SEI 31-03	Seismic Evaluation of Existing Buildings [Existing Building Alteration/Renovation]
ASCE/SEI 41-06	Seismic Rehabilitation of Existing Buildings [Existing Building Alteration/Renovation]
American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)	
ASHRAE 90.1	ANSI/ASHRAE/IESNA 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE Guideline 0	The Commissioning Process
ASHRAE Guideline 1.1	The HVAC Commissioning Process
ASHRAE Handbooks	Fundamentals, HVAC Applications, Systems and Equipment, Refrigeration (Applicable, except as otherwise specified)
ASHRAE Standard 15	Safety Standard for Refrigeration Systems
ASHRAE Standard 62.1	Ventilation for Acceptable Indoor Air Quality
ASHRAE Standard 55	Thermal Environmental Conditions for Human Occupancy

American Society of Mechanical Engineers International (ASME)	
ASME BPVC SEC VII	Boiler and Pressure Vessel Code: Section VII Recommended Guidelines for the Care of Power Boilers
ASME A17.1	Safety Code for Elevators and Escalators
ASME B 31 (Series)	Piping Codes
American Water Works Association (AWWA)	
	Standards [standards for water line materials and construction]
American Welding Society	
	Welding Handbook
	Welding Codes and Specifications (as applicable to application, see International Building Code for example)
Architectural Woodwork Institute (AWI)	
Version 1.2	AWI Quality Standards 7th Edition
Associated Air Balance Council (AABC)	
AABC MN-1	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems
	AABC Associated Air Balance Council Testing and Balance Procedures
ASTM International	
ASTM C1060-90(1997)	Standard Practice for Thermographic Inspection of Insulation Installations in Envelope Cavities of Frame Buildings
ASTM E 779 (2003)	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
ASTM E1827-96(2002)	Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
Builders Hardware Manufacturers Association (BHMA)	
ANSI/BHMA	American National Standards for Builders Hardware

Building Industry Consulting Service International	
	Telecommunications Distribution Methods Manual (TDMM)
	Customer-Owned Outside Plant Design Manual (CO-OSP)
Code of Federal Regulations (CFR)	
49 CFR 192	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
10 CFR 430	Energy Conservation Program for Consumer Products
Consumer Electronics Association	
CEA 709.1B	Control Network Protocol Specification
CEA 709.3	Free-Topology Twisted-Pair Channel Specification
CEA 852	Tunneling Component Network Protocols Over Internet Protocol Channels
Electronic Industries Association (EIA)	
ANSI/EIA/TIA 568	Structured Cabling Series
ANSI/EIA/TIA 569	Commercial Building Standard for Telecommunications Pathways and Spaces (includes ADDENDA)
ANSI/TIA/EIA-606	Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings
J-STD EIA/TIA 607	Commercial Building Grounding and Bonding Requirements for Telecommunications
Federal Highway Administration (FHWA)	
	Manual on Uniform Traffic Control Devices for Streets and Highways [signage and pavement markings for streets and highways]
FHWA-NHI-01-021	Hydraulic Engineering Circular No. 22, Second Edition, URBAN DRAINAGE DESIGN MANUAL
Illuminating Engineering Society of North America (IESNA)	
IESNA RP-1	Office Lighting

IESNA RP-8	Roadway Lighting
IESNA Lighting Handbook	Reference and Application
Institute of Electrical and Electronics Engineers Inc. (IEEE)	
	Standard for Use of the International System of Units (SI): the Modern Metric System
Standard 1100	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
International Code Council (ICC)	
IBC	<p>International Building Code</p> <p>Note: All references in the International Building Code to the International Electrical Code shall be considered to be references to NFPA 70.</p> <p>All references in the International Building Code to the International Fuel Gas Code shall be considered to be references to NFPA 54 and NFPA 58.</p> <p>All references in the International Building Code to the International Fire Code and Chapter 9 shall be considered to be references to Unified Facilities Criteria (UFC) 3-600-01.</p>
IMC	<p>International Mechanical Code –</p> <p>Note: For all references to “HEATING AND COOLING LOAD CALCULATIONS”, follow ASHRAE 90.1</p> <p>Note: For all references to “VENTILATION”, follow ASHRAE 62.1</p>
IRC	International Residential Code
IPC	International Plumbing Code
IEC	Energy Conservation Code (IEC) –Applicable only to the extent specifically referenced herein. Refer to Paragraph 5, ENERGY CONSERVATION requirements.
IGC	International Gas Code - not applicable. Follow NFPA 54, National Fuel Gas Code and NFPA 58, Liquefied Petroleum Gas Code.
International Organization for Standardization (ISO)	
ISO 6781:1983	Qualitative detection of thermal irregularities in building envelopes –

	infrared method
LonMark International (LonMark)	
LonMark Interoperability Guidelines	(available at www.lonmark.org), including: Application Layer Guidelines, Layer 1-6 Guidelines, and External Interface File (XIF) Reference Guide
LonMark Resource Files	(available at www.lonmark.org), including Standard Network Variable Type (SNVT) definitions
Metal Building Manufacturers Association (MBMA)	
	Metal Building Systems Manual
Midwest Insulation Contractors Association (MICA)	
	National Commercial and Industrial Insulation Standards Manual
National Association of Corrosion Engineers International (NACE)	
NACE RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0185	Extruded, Polyolefin Resin Coating Systems with Adhesives for Underground or Submerged Pipe
NACE RP0285	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection
NACE RP0286	Electrical Isolation of Cathodically Protected Pipelines
National Electrical Manufacturers Association (NEMA)	
National Environmental Balancing Bureau (NEBB)	
	Procedural Standards Procedural Standards for Testing Adjusting Balancing of Environmental Systems
National Fire Protection Association (NFPA)	
NFPA 10	Standard for Portable Fire Extinguishers
NFPA 13	Installation of Sprinkler Systems
NFPA 13R	Residential Occupancies up to and Including Four Stories in Height Sprinkler Systems

NFPA 14	Standard for the Installation of Standpipes and Hose Systems
NFPA 20	Installation of Centrifugal Fire Pumps
NFPA 24 NFPA 25	Standard for the Installation of Private Fire Service Mains and Their Appurtenances [underground fire protection system design] Inspection, Testing And Maintenance Of Water-Based Fire Protection Systems
NFPA 30	Flammable and Combustible Liquids Code
NFPA 30A	Motor Fuel Dispensing Facilities and Repair Garages
NFPA 31	Installation of Oil Burning Equipment
NFPA 54	National Fuel Gas Code
NFPA 58	Liquefied Petroleum Gas Code
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm Code
NFPA 76	Fire Protection of Telecommunications Facilities
NFPA 80	Standard for Fire Doors and Fire Windows
NFPA 90a	Installation of Air Conditioning and Ventilating Systems
NFPA 96	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
NFPA 101	Life Safety Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
National Roofing Contractor's Association (NRCA)	
	Roofing and Waterproofing Manual
National Sanitation Foundation, International	
NSF/ANSI Std. 2, 3, 4, 5, 6, 7, 8, 12, 13, 18, 20, 21, 25, 29, 35, 36, 37, 51, 52, 59,	Food Equipment Standards

169	
ANSI/UL Std. 73, 197, 471, 621, 763	Food Equipment Standards
CSA Std. C22.2 No. 109, 120, 195	Food Equipment Standards
Occupational Safety and Health Administration (OSHA)	
Title 29, Part 1926	OSHA Construction Industry Standards, Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction
Plumbing and Drainage Institute (PDI)	
PDI G 101	Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data
PDI WH201	Water Hammer Arrestors
Precast Concrete Institute	
PCI Design Handbook	Precast and Prestressed Concrete
Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)	
SMACNA HVAC Duct Construction Standards	HVAC Duct Construction Standards - Metal and Flexible
SMACNA Architectural Manual	Architectural Sheet Metal Manual
SMACNA HVAC TAB	HVAC Systems - Testing, Adjusting and Balancing
State/Local Regulations	
	State Department of Transportation Standard Specifications for Highway and Bridge Construction
	Sedimentation and Erosion Control Design Requirements
	Environmental Control Requirements
	Storm Water Management Requirements
Steel Door Institute (SDI)	

ANSI A250.8/SDI 100	Standard Steel Doors and Frames
Steel Deck Institute	
	SDI Diaphragm Design Manual
Steel Joist Institute	
	Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders
Underwriters Laboratories (UL)	
UL 96A	Installation Requirements for Lightning Protection Systems
UL 300	Standard for Safety for Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas
UNITED STATES ACCESS BOARD: U.S. ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD	
ADA and ABA Accessibility Guidelines for Buildings and Facilities	<p>ABA Accessibility Standard for DoD Facilities</p> <p>Derived from the ADA and ABA Accessibility Guidelines: Specifically includes: ABA Chapters 1 and 2 and Chapters 3 through 10.</p> <p>Use this reference in lieu of IBC Chapter 11.</p> <p>Excluded are:</p> <p>(a) Facilities, or portions of facilities, on a military installation that are designed and constructed for use exclusively by able-bodied military personnel (See Paragraph 3 for any reference to this exclusion).</p> <p>(b) Reserve and National Guard facilities, or portions of such facilities, owned by or under the control of the Department of Defense, that are designed and constructed for use exclusively by able-bodied military personnel. (See paragraph 3 for any reference to this exclusion).</p>
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES	
	FDA National Food Code
U.S. GREEN BUILDING COUNCIL (USGBC)	
LEED-NC	Green Building Rating System for New Construction & Major Renovations
	Application Guide for Multiple Buildings and On-Campus Building Projects

4.2. MILITARY CRITERIA

The project shall conform to the following criteria. Certain design impacts and features due to these criteria are noted for the benefit of the offeror. However, all requirements of the referenced criteria will be applicable, whether noted or not, unless otherwise specified herein.

4.2.1. Energy Policy Act of 2005 (Public Law 109-58) (applies only to the extent specifically implemented in the contract, which may or may not directly cite or reference EPACT)

4.2.2. Executive Order 12770: Metric Usage In Federal Government

(a) Metric design and construction is required except when it increases construction cost. Offeror to determine most cost efficient system of measurement to be used for the project.

4.2.3. TB MED 530: Occupational and Environmental Health Food Sanitation

4.2.4. Unified Facilities Criteria (UFC) 3-410-01FA: Heating, Ventilating, and Air Conditioning - applicable only to the extent specified in paragraph 5, herein.

4.2.5. Deleted.

4.2.6. UFC 3-600-01 Design: Fire Protection Engineering for Facilities. Use the latest edition of the IBC in coordination with this UFC. Use Chapters 3, 6, 7, 33 and UFC 3-600-01. If any conflict occurs between these Chapters and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence. Use UFC 3-600-01 in lieu of IBC Chapters 4, 8,9,10.

4.2.7. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings

4.2.8. UFC 4-023-03 Design of Buildings to Resist Progressive Collapse (Use most recent version, regardless of references thereto in other publications)

(a) Note the option to use tie force method or alternate path design for Occupancy Category II.

4.2.9. UFC 4-021-01 Design and O&M: Mass Notification Systems

4.2.10. Technical Criteria for Installation Information Infrastructure Architecture (I3A)

(a) Email: DetrickISECI3Aguide@conus.army.mil

4.2.11. U.S. Army Information Systems Engineering Command (USAISEC) TG for the Integration of SECRET Internet Protocol (IP) Router Network (SIPRNET). See Paragraph 3 for applicability to specific facility type. May not apply to every facility. This is mandatory criteria for those facilities with SIPRNET.

5.0 GENERAL TECHNICAL REQUIREMENTS

This paragraph contains general technical requirements. See also Paragraph 3 for facility-specific technical requirements. Residential or similar grade finishes and materials are not acceptable for inclusion in these buildings, unless otherwise specifically allowed.

5.1. SITE PLANNING AND DESIGN

5.1.1. STANDARDS AND CODES: The site planning and design shall conform to APPLICABLE CRITERIA and to paragraph 6, PROJECT SPECIFIC REQUIREMENTS.

5.1.2. SITE PLANNING OBJECTIVES: Group buildings in configurations that create a sense of community and promote pedestrian use. See paragraph 3 for additional site planning requirements relating to building functions.

5.1.2.1. Provide enclosures and or visual screening devices for Outdoor Utility such as dumpsters, emergency generators, transformers, heating, ventilation, and air conditioning units from streetscape and courtyard views to limit visual impact. Enclosures shall be compatible with the building they serve and accessible by vehicle. The location of dumpsters can have a significant visual impact and should be addressed as part of an overall building design and incorporated in site planning.

5.1.2.2. Where included in the project, dumpster pads shall be concrete (minimum of 8 inches thick on 4 inch base course, unless site conditions dictate more conservative requirements) and directly accessible by way of a paved service drive or parking lot with adequate overhead clearance for collection vehicles. Provide space at dumpster areas for recycling receptacles. Coordinate with Installation on recycling receptacle types, sizes and access requirements and provide space at dumpster areas to accommodate them.

5.1.2.3. Vehicular Circulation. Apply design vehicle templates provided by the American Association of State Highway and Transportation Officials (AASHTO) to the site design. The passenger car class includes passenger cars and light trucks, such as vans and pick-ups. The passenger car template is equivalent to the non-organizational – privately owned vehicle (POV). The truck class template includes single-unit trucks, recreation vehicles, buses, truck tractor-semi-trailer combinations, and trucks or truck tractors with semi-trailers in combination with full trailers. Provide vehicle clearances required to meet traffic safety for emergency vehicles, service vehicles, and moving vans. Provide required traffic control signage Site entrances and site drive aisles shall maximize spacing between drives, incorporate right-angle turns, and limit points of conflict between traffic. Design Services Drives to restrict access to unauthorized vehicles by removable bollards, gates, or other barriers to meet Anti-Terrorism/Force Protection (ATFP) requirements. Orient service drives to building entrances other than the primary pedestrian entry at the front of the building.

5.1.2.4. Provide Emergency Vehicle Access around the facility and shall be in accordance with AT/FP requirements. Maintain a 33-foot clear zone buffer for emergency vehicles, designed to prevent other vehicles from entering the AT/FP standoff to the building.

5.1.2.5. Clear and grub all trees and vegetation necessary for construction; but, save as many trees as possible. Protect trees to be saved during the construction process from equipment.

5.1.2.6. Stormwater Management. Employ design and construction strategies (Best Management Practices) that reduce stormwater runoff, reduce discharges of polluted water offsite and maintain or restore predevelopment hydrology with respect to temperature, rate, volume and duration of flow to the maximum extent practicable. See paragraph 6, PROJECT SPECIFIC requirements for additional information.

5.1.3. EXTERIOR SIGNAGE: Provide exterior signage in accordance with Appendix H, Exterior Signage. Provide exterior NO SMOKING signage that conveys building and grounds smoking policy.

5.1.4. EXISTING UTILITIES: Base utilities maps and capacities for this site are included as part of this RFP. See paragraph 6 for more detailed information.

5.2. SITE ENGINEERING

5.2.1. STANDARDS AND CODES: The site engineering shall conform to APPLICABLE CRITERIA.

5.2.2. SOILS:

5.2.2.1. A report has been prepared to characterize the subsurface conditions at the project site and is **appended to these specifications**. The report provides a general overview of the soil and geologic conditions with detailed descriptions at discrete boring locations. The Contractor's team shall include a licensed geotechnical engineer to interpret the report and develop earthwork and foundation recommendations and design parameters in which to base the contractor's design. If any additional subsurface investigation or laboratory analysis is required to better characterize the site or develop the final design, the Contractor shall perform it under the direction of a licensed geotechnical engineer. There will be no separate payment for the cost of additional tests. If differences between the Contractor's additional subsurface investigation and the government provided soils report or the reasonably expected conditions require material revisions in the design, an equitable adjustment may be made, in accordance with the provisions of the Differing Site Conditions clause. The basis for the adjustment would be the design and construction appropriate for the conditions described in the Government furnished report or the reasonably expected conditions, in comparison with any changes required by material differences in the actual conditions encountered, in accordance with the terms of contract clause Differing Site Conditions.

5.2.2.2. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal, as described in Section 01 33 16, *Design After Award*.

5.2.3. VEHICLE PAVEMENTS: (as applicable to the project)

5.2.3.1. Design procedures and materials shall conform to one of the following: 1) the USACE Pavement Transportation Computer Assisted Structural Engineering (PCASE) program, 2) American Association of State Highway and Transportation Officials (AASHTO) or, 3) the applicable state Department of Transportation standards in which the project is located. See paragraph 5.2.2.2 and Section 01 33 16 for required information for the Contractor's geotechnical evaluation report. The minimum flexible pavement section shall consist of 2 inches of asphalt and 6 inches of base or as required by the pavement design, whichever is greater, unless specifically identified by the Government to be a gravel road. Design roads and parking areas for a life expectancy of 25 years with normal maintenance. Parking area for tactical vehicles (as applicable to the project) shall be Portland Cement Concrete (PCC) rigid pavement design. For concrete pavements, submit joint layout plan for review and concurrence. Design pavements for military tracked vehicles (as applicable to the project) IAW USACE PCASE. Traffic estimates for each roadway area will be as shown on the drawings or listed in Section 01 10 00 Paragraph 6.4.4. Pavement markings and traffic signage shall comply with the Installation requirements and with the Manual on Uniform Traffic Control Devices.

5.2.3.2. Parking Requirements.

- (a) All handicap POV parking lots (where applicable in the facility specific requirements) shall meet the ADA and ABA Accessibility Guidelines for accessible parking spaces.
- (b) Design POV parking spaces for the type of vehicles anticipated, but shall be a minimum of 9 ft by 18 ft for POVs, except for two wheel vehicles.

5.2.3.3. Sidewalks. Design the network of walks throughout the complex (where applicable) to facilitate pedestrian traffic among facilities, and minimize the need to use vehicles. Incorporate sidewalks to enhance the appearance of the site development, while creating a sense of entry at the primary patron entrances to the buildings. Minimum sidewalk requirements are in Paragraph 3, where applicable.

5.2.4. CATHODIC PROTECTION: Provide cathodic protection systems for all underground metallic systems and metallic fittings/portions of non-metallic, underground systems, both inside and outside the building 5 foot line that are subject to corrosion. Coordinate final solutions with the installation to insure an approach that is consistent with installation cathodic protection programs.

5.2.5. UTILITIES: See paragraph 6.4.6 for specific information on ownership of utilities and utility requirements. Meter all utilities (gas, water, and electric, as applicable) to each facility. For Government owned utilities, install meters that are wireless data transmission capable as well as have a continuous manual reading option. All meters will be capable of at least hourly data logging and transmission and provide consumption data for gas, water, and electricity. Gas and electric meters will also provide demand readings based on consumption over a maximum of

any 15 minute period. Configure all meters to transmit at least daily even if no receiver for the data is currently available at the time of project acceptance. For privatized utilities, coordinate with the privatization utility(ies) for the proper meter base and meter installation.

5.2.6. PERMITS: The CONTRACTOR shall be responsible for obtaining all permits (local, state and federal) required for design and construction of all site features and utilities.

5.2.7. IRRIGATION. Landscape irrigation systems, if provided, shall comply with the following:

5.2.7.1. Irrigation Potable Water Use Reduction. Reduce irrigation potable water use by 100 percent using LEED credit WE1.1 baseline (no potable water used for irrigation), except where precluded by other project requirements.

5.2.8. EPA WaterSense Products and Contractors. Except where precluded by other project requirements, use EPA WaterSense labeled products and irrigation contractors that are certified through a WaterSense labeled program where available.

5.3. ARCHITECTURE AND INTERIOR DESIGN:

This element will be evaluated per APPLICABLE CRITERIA under the quality focus.

5.3.1. STANDARDS AND CODES: The architecture and interior design shall conform to APPLICABLE CRITERIA.

5.3.2. GENERAL: Overall architectural goal is to provide a functional, quality, visually appealing facility that is a source of pride for the installation and delivered within the available budget and schedule.

5.3.3. COMPUTATION OF AREAS: See APPENDIX Q for how to compute gross and net areas of the facility(ies).

5.3.4. BUILDING EXTERIOR: Design buildings to enhance or compliment the visual environment of the Installation. Where appropriate, reflect a human scale to the facility. Building entrance should be architecturally defined and easily seen. When practical, exterior materials, roof forms, and detailing shall be compatible with the surrounding development and adjacent buildings on the Installation and follow locally established architectural themes. Use durable materials that are easy to maintain. Exterior colors shall conform to the Installation requirements. See paragraph 6.

5.3.4.1. Building Numbers: Each building shall have exterior signage permanently attached on two faces of the building indicating the assigned building number or address. Building number signage details and locations shall conform to Appendix H, Exterior Signage.

5.3.5. BUILDING INTERIOR

5.3.5.1. Space Configuration: Arrange spaces in an efficient and functional manner in accordance with area adjacency matrices.

5.3.5.2. Surfaces: Appearance retention is the top priority for building and furniture related finishes. Provide low maintenance, easily cleaned room finishes that are commercially standard for the facility occupancy specified, unless noted otherwise.

5.3.5.3. Color: The color, texture and pattern selections for the finishes of the building shall provide an aesthetically pleasing, comfortable, easily maintainable and functional environment for the occupants. Coordination of the building colors and finishes is necessary for a cohesive design. Color selections shall be appropriate for the building type. The use of color, texture and pattern shall be used to path or way find through the building. Trendy colors that will become dated shall be limited to non-permanent finishes such as carpet and paint. Finishes should be selected with regards to aesthetics, maintenance, durability, life safety and image. Limit the number of similar colors for each material. Color of Ceramic and porcelain tile grout shall be medium range color to help hide soiling. Plastic laminate and solid surface materials shall have patterns that are mottled, flecked or speckled. Finish colors of fire extinguisher cabinets, receptacle bodies and plates, fire alarms / warning lights, emergency lighting, and other miscellaneous items shall be coordinated with the building interior. Color of equipment items on ceilings (speakers, smoke detectors, grills, etc.) shall match the ceiling color.

5.3.5.4. Circulation: Circulation schemes must support easy way finding within the building.

5.3.5.5. Signage: Provide interior signage for overall way finding and life safety requirements. A comprehensive interior plan shall be from one manufacturer. Include the following sign types: (1) Lobby Directory, (2) Directional Signs; (3) Room Identification Signs; (4) Building Service Signs; (5) Regulatory Signs; (6) Official and Unofficial Signs (7) Visual Communication Boards (8) NO SMOKING signage that conveys building smoking policy. Use of emblems or logos may also be incorporated into the signage plan.

5.3.5.6. Window Treatment: Interior window treatments with adjustable control shall be provided in all exterior window locations for control of day light coming in windows or privacy at night. Uniformity of treatment color and material shall be maintained to the maximum extent possible within a building.

5.3.6. COMPREHENSIVE INTERIOR DESIGN

5.3.6.1. Comprehensive Interior Design includes the integration of a Structural Interior Design (SID) and a Furniture, Fixtures and Equipment (FF&E) design and package. SID requires the design, selection and coordination of interior finish materials that are integral to or attached to the building structure. Completion of a SID involves the selection and specification of applied finishes for the building's interior features including, but not limited to, walls, floors, ceilings, trims, doors, windows, window treatments, built-in furnishings and installed equipment, lighting, and signage. The SID package includes finish schedules, finish samples and any supporting interior elevations, details or plans necessary to communicate the building finish design and build out. The SID also provides basic space planning for the anticipated FF&E requirements in conjunction with the functional layout of the building and design issues such as life safety, privacy, acoustics, lighting, ventilation, and accessibility. See Section 01 33 16 for SID design procedures.

The FF&E design and package includes the design, selection, color coordination and of the required furnishing items necessary to meet the functional, operational, sustainability, and aesthetic needs of the facility coordinated with the interior finish materials in the SID. The FF&E package includes the specification, procurement documentation, placement plans, ordering and finish information on all freestanding furnishings and accessories, and a cost estimate. Coordinate the selection of furniture style, function and configuration with the defined requirements. Examples of FF&E items include, but are not limited to workstations, seating, files, tables, beds, wardrobes, draperies and accessories as well as marker boards, tack boards, and presentation screens. Criteria for furniture selection include function and ergonomics, maintenance, durability, sustainability, comfort and cost. See Section 01 33 16 for FFE design procedures.

5.4. STRUCTURAL DESIGN

5.4.1. STANDARDS AND CODES: The structural design shall conform to APPLICABLE CRITERIA.

5.4.2. GENERAL: The structural system needs to be compatible with the intended functions and components that allows for future flexibility and reconfigurations of the interior space. Select an economical structural system based upon facility size, projected load requirements and local availability of materials and labor. Base the structural design on accurate, site specific geotechnical information and anticipated loads for the building types and geographical location. When modular units or other pre-fabricated construction is used or combined with stick-built construction, fully coordinate and integrate the overall structural design between the two different or interfacing construction types. If the state that the project is located in requires separate, specific licensing for structural engineers (for instance, such as in Florida, California and others), then the structural engineer designer of record must be registered in that state.

5.4.3. LOADS: See paragraph 3 for facility specific (if applicable) and paragraph 6 for site and project specific structural loading criteria. Unless otherwise specified in paragraph 6, use Exposure Category C for wind. If not specified, use Category C unless the Designer of Record can satisfactorily justify another Exposure Category in its design analysis based on the facility Master Plan. Submit such exceptions for approval as early as possible and prior to the Interim Design Submittal in Section "Design After Award"

5.4.4. TERMITE TREATMENT: (Except Alaska) Provide termite prevention treatment in accordance with Installation and local building code requirements, using licensed chemicals and licensed applicator firm.

5.5. THERMAL PERFORMANCE

5.5.1. STANDARDS AND CODES: Building construction and thermal insulation for mechanical systems shall conform to APPLICABLE CRITERIA.

5.5.2. BUILDING ENVELOPE SEALING PERFORMANCE REQUIREMENT. Design and construct the building envelope for office buildings, office portions of mixed office and open space (e.g., company operations facilities), dining, barracks and instructional/training facilities with a continuous air barrier to control air leakage into, or out of, the conditioned space. Clearly identify all air barrier components of each envelope assembly on construction documents and detail the joints, interconnections and penetrations of the air barrier components. Clearly identify the boundary limits of the building air barriers, and of the zone or zones to be tested for building air tightness on the drawings.

5.5.2.1. Trace a continuous plane of air-tightness throughout the building envelope and make flexible and seal all moving joints.

5.5.2.2. The air barrier material(s) must have an air permeance not to exceed 0.004 cfm / sf at 0.3" wg (0.02 L/s.m2 @ 75 Pa) when tested in accordance with ASTM E 2178

5.5.2.3. Join and seal the air barrier material of each assembly in a flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of these assemblies and components.

5.5.2.4. Support the air barrier so as to withstand the maximum positive and negative air pressure to be placed on the building without displacement, or damage, and transfer the load to the structure.

5.5.2.5. Seal all penetrations of the air barrier. If any unavoidable penetrations of the air barrier by electrical boxes, plumbing fixture boxes, and other assemblies are not airtight, make them airtight by sealing the assembly and the interface between the assembly and the air barrier or by extending the air barrier over the assembly.

5.5.2.6. The air barrier must be durable to last the anticipated service life of the assembly.

5.5.2.7. Do not install lighting fixtures with ventilation holes through the air barrier

5.5.2.8. Provide a motorized damper in the closed position and connected to the fire alarm system to open on call and fail in the open position for any fixed open louvers such as at elevator shafts.

5.5.2.9. Damper and control to close all ventilation or make-up air intakes and exhausts, atrium smoke exhausts and intakes, etc when leakage can occur during inactive periods.

5.5.2.10. Compartmentalize garages under buildings by providing air-tight vestibules at building access points.

5.5.2.11. Compartmentalize spaces under negative pressure such as boiler rooms and provide make-up air for combustion.

5.5.2.12. Performance Criteria and Substantiation: Submit the qualifications and experience of the testing entity for approval. Demonstrate performance of the continuous air barrier for the opaque building envelope by the following tests:

(a) Test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed 0.25cfm/ft2 at a pressure differential of 0.3" w.g.(75 Pa) in accordance with ASTM's E 779 (2003) or E-1827-96 (2002). Accomplish tests using either pressurization or depressurization or both. Divide the volume of air leakage in cfm @ 0.3" w.g. (L/s @ 75 Pa) by the area of the pressure boundary of the building, including roof or ceiling, walls and floor to produce the air leakage rate in cfm/ft2 @ 0.3" w.g. (L/s.m2 @ 75 Pa). Do not test the building until verifying that the continuous air barrier is in place and installed without failures in accordance with installation instructions so that repairs to the continuous air barrier, if needed to comply with the required air leakage rate, can be done in a timely manner.

(b) Test the completed building using Infrared Thermography testing. Use infrared cameras with a resolution of 0.1deg C or better. Perform testing on the building envelope in accordance with ISO 6781:1983 and ASTM C1060-90(1997). Determine air leakage pathways using ASTM E 1186-03 Standard Practices for Air Leakage Site

Detection in Building Envelopes and Air Barrier Systems, and perform corrective work as necessary to achieve the whole building air leakage rate specified in (a) above.

(c) Notify the Government at least three working days prior to the tests to provide the Government the opportunity to witness the tests. Provide the Government written test results confirming the results of all tests.

5.6. PLUMBING

5.6.1. STANDARDS AND CODES: The plumbing system shall conform to APPLICABLE CRITERIA.

5.6.2. PRECAUTIONS FOR EXPANSIVE SOILS: Where expansive soils are present, the design for underslab piping systems and underground piping serving chillers, cooling towers, etc, shall include features to control forces resulting from soil heave. Some possible solutions include, but are not necessarily limited to, features such as flexible expansion joints, slip joints, horizontal offsets with ball joints, or multiple bell and spigot gasketed fittings. For structurally supported slabs, piping should be suspended from the structure with adequate space provided below the pipe for the anticipated soil movement.

5.6.3. HOT WATER SYSTEMS: For Hot Water heating and supply, provide a minimum temp of 140 Deg F in the storage tank and a maximum of 110 Deg F at the fixture, unless specific appliances or equipment specifically require higher temperature water supply.

5.6.4. SIZING HOT WATER SYSTEMS: Unless otherwise specified or directed in paragraph 3, design in accordance with ASHRAE Handbook Series (appropriate Chapters), ASHRAE Standard 90.1, and the energy conservation requirements of the contract. Size and place equipment so that it is easily accessible and removable for repair or replacement.

5.6.5. JANITOR CLOSETS: In janitor spaces/room/closets, provide at minimum, a service sink with heavy duty shelf and wall hung mop and broom rack(s).

5.6.6. FLOOR DRAINS: As a minimum, provide floor drains in mechanical rooms and areas, janitor spaces/rooms/closets and any other area that requires drainage from fixtures or equipment, drain downs, condensate, as necessary.

5.6.7. URINALS: Urinals shall be vitreous china, wall-mounted, wall outlet, non-water using, with integral drain line connection, and with sealed replaceable cartridge or integral liquid seal trap. Either type shall use a biodegradable liquid to provide the seal and maintain a sanitary and odor-free environment. Install, test and maintain in accordance with manufacturer's recommendations. Slope the sanitary sewer branch line for non-water use urinals a minimum of 1/4 inch per foot. Do not use copper tube or pipe for drain lines that connect to the urinal. Manufacturer shall provide an operating manual and on-site training to installation operations personnel for the proper care and maintenance of the urinal. For complexes, non-water using urinals are not required for barracks type spaces.

5.6.8. BUILDING WATER USE REDUCTION. Reduce building potable water use in each building 30 percent using IPC fixture performance requirements baseline.

5.6.9. Do not use engineered vent or Sovent® type drainage systems.

5.6.10. Where the seasonal design temperature of the cold water entering a building is below the seasonal design dew point of the indoor ambient air, and where condensate drip will cause damage or create a hazard, insulate plumbing piping with a vapor barrier type of insulation to prevent condensation. Do not locate water or drainage piping over electrical wiring or equipment unless adequate protection against water (including condensation) damage is provided. Insulation alone is not adequate protection against condensation. Follow ASHRAE Fundamentals Chapter 23, Insulation for Mechanical Systems, IMC paragraph 1107 and International Energy Conservation Code for pipe insulation requirements.

5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

5.7.1. STANDARDS AND CODES: The electrical systems for all facilities shall conform to APPLICABLE CRITERIA.

5.7.2. MATERIALS AND EQUIPMENT: Materials, equipment and devices shall, as a minimum, meet the requirements of Underwriters Laboratories (UL) where UL standards are established for those items. Wiring for branch circuits shall be copper. Motors larger than one-half horsepower shall be three phase. All electrical systems shall be pre-wired and fully operational unless otherwise indicated. Wall mounted electrical devices (power receptacles, communication outlets and CATV outlets) shall have matching colors, mounting heights and faceplates.

5.7.3. POWER SERVICE: Primary service from the base electrical distribution system to the pad-mounted transformer and secondary service from the transformer to the building service electrical equipment room shall be underground. See paragraph 6 for additional site electrical requirements.

5.7.3.1. Spare Capacity: Provide 10% space for future circuit breakers in all panelboards serving residential areas of buildings and 15% spaces in all other panelboards.

5.7.4. TELECOMMUNICATION SERVICE: The project's facilities must connect to the Installation telecommunications (voice and data) system through the outside plant (OSP) telecommunications underground infrastructure cabling system per the I3A Criteria. Connect to the OSP cabling system from each facility main cross connect located in the telecommunications room.

5.7.5. LIGHTING: Comply with the recommendations of the Illumination Engineering Society of North America (IESNA), the National Energy Policy Act and Energy Star requirements for lighting products..

5.7.5.1. Interior Lighting:

(a) Reflective Surfaces: Coordinate interior architectural space surfaces and colors with the lighting systems to provide the most energy-efficient workable combinations.

(b) High Efficiency Fluorescent Lighting: Utilize NEMA premium electronic ballasts and energy efficient fluorescent lamps with a Correlated Color Temperature (CCT) of 4100K. Linear fluorescent and compact fluorescent fixtures shall have a Color Rendering Index of (CRI) of 87 or higher. Fluorescent lamps shall be the low mercury type qualifying as non-hazardous waste upon disposal. Do not use surface mounted fixtures on acoustical tile ceilings. Provide an un-switched fixture with emergency ballast shall be provided at each entrance to the building.

(c) Solid State Lighting: Fixtures shall provide lighting with a minimum Correlated Color Temperature (CCT) of 4100K and shall have a Color Rendering Index of (CRI) of 75 or higher. Verify performance of the light producing solid state components by a test report in compliance with the requirements of IESNA LM 80. Verify performance of the solid state light fixtures by a test report in compliance with the requirements of IESNA LM 79. Provide lab results by a NVLAP certified laboratory. The light producing solid state components and drivers shall have a life expectancy of 50,000 operating hours while maintaining at least 70% of original illumination level. Provide a complete five year warranty for fixtures.

(d) Metal Halide Lighting (where applicable): Metal Halide lamp fixtures in the range of 150-500 Watts shall be pulse start type and have a minimum efficiency rating of 88%.

(e) Lighting Controls: ANSI/ASHRAE/IESNA 90.1 has specific lighting controls requirements. Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (classrooms, conference rooms) to promote the productivity, comfort and well being of the building occupants. In office spaces, the preferred lighting should be a 30 FC ambient lighting level with occupancy sensor controlled task lighting in the work spaces to provide a composite lighting level of 50 FC on the working surfaces. Consider incorporating daylighting techniques for the benefit of reducing lighting energy requirements while improving the quality of the indoor spaces. If daylight strategies are used, additional coordination is required with the architect and mechanical engineer. Additionally, incorporate electric lighting controls to take advantage of the potential energy savings.

(f) Exterior Lighting: See paragraph 6.9 for site specific information, if any, on exterior lighting systems. Minimize light pollution and light trespass by not over lighting and use cutoff type exterior luminaries.

5.7.6. TELECOMMUNICATION SYSTEM: All building telecommunications cabling systems (BCS) and OSP telecommunications cabling system shall conform to APPLICABLE CRITERIA to include I3A Technical Criteria. An acceptable BCS encompasses, but is not limited to, copper and fiber optic (FO) entrance cable, termination equipment, copper and fiber backbone cable, copper and fiber horizontal distribution cable, workstation outlets, racks, cable management, patch panels, cable tray, cable ladder, conduits, grounding, and labeling.. Items included

under OSP infrastructure encompass, but are not limited to, manhole and duct infrastructure, copper cable, fiber optic cable, cross connects, terminations, cable vaults, and copper and FO entrance cable.

5.7.6.1. Design, install, label and test all telecommunications systems in accordance with the I3A Criteria and ANSI/TIA/EIA 568, 569, and 606 standards. A Building Industry Consulting Services International (BICSI) Registered Communications Distribution Designer (RCDD) with at least 2 yrs related experience shall develop and stamp telecommunications design, and prepare the test plan. See paragraph 5.8.2.5 for design of environmental systems for Telecommunications Rooms.

5.7.6.2. The installers assigned to the installation of the telecommunications system or any of its components shall be regularly and professionally engaged in the business of the application, installation and testing of the specified telecommunications systems and equipment. Key personnel; i.e., supervisors and lead installers assigned to the installation of this system or any of its components shall be BICSI Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification for each of the key personnel. In lieu of BICSI certification, supervisors and installers shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products.

5.7.6.3. Perform a comprehensive end to end test of all circuits to include all copper and fiber optic cables upon completion of the BCS and prior to acceptance of the facility. The BCS circuits include but are not limited to all copper and fiber optic(FO) entrance cables, termination equipment, copper and fiber backbone cable, copper and fiber horizontal distribution cable, and workstation outlets. Test in accordance with ANSI/EIA/TIA 568 standards. Use test instrumentation that meets or exceeds the standard. Submit the official test report to include test procedures, parameters tested, values, discrepancies and corrective actions in electronic format. Test and accomplish all necessary corrective actions to ensure that the government receives a fully operational, standards based, code compliant telecommunications system.

5.7.7. LIGHTNING PROTECTION SYSTEM: Provide a lightning protection system where recommended by the Lightning Risk Assessment of NFPA 780, Annex L.

5.8. HEATING, VENTILATING, AND AIR CONDITIONING

5.8.1. STANDARDS AND CODES: The HVAC system shall conform to APPLICABLE CRITERIA.

5.8.2. DESIGN CONDITIONS.

5.8.2.1. Outdoor and indoor design conditions shall be in accordance with UFC 3-410-01FA. Outdoor air and exhaust ventilation requirements for indoor air quality shall be in accordance with ASHRAE 62.1. All Buildings with minimum LEED Silver requirement (or better) will earn LEED Credit EQ 7.1, Thermal Comfort-Design.

5.8.2.2. Design systems in geographical areas that meet the definition for high humidity in UFC 3-410-01FA in accordance with the special criteria for humid areas therein.

5.8.2.3. Cooling equipment may be oversized by up to 15 percent to account for recovery from night setback. Heating equipment may be oversized by up to 30 percent to account for recovery from night setback. Design single zone systems and multi-zone systems to maintain an indoor design condition of 50% relative humidity for cooling only. For heating only where the indoor relative humidity is expected to fall below 20% for extended periods, add humidification to increase the indoor relative humidity to 30%. Provide ventilation air from a separate dedicated air handling unit (DOAU) for facilities using multiple single zone fan-coil type HVAC systems. Do not condition outside air through fan coil units. Avoid the use of direct expansion cooling coils in air handling units with constant running fans that handle outside air.

5.8.2.4. Locate all equipment so that service, adjustment and replacement of controls or internal components are readily accessible for easy maintenance.

5.8.2.5. Environmental Requirements for Telecommunications Rooms,(including SIPRNET ROOMS, where applicable for specific facility type). Comply with ANSI/EIA/TIA 569 and the I3A.

5.8.2.6. Fire dampers: dynamic type with a dynamic rating suitable for the maximum air velocity and pressure differential to which the damper is subjected. Test each fire damper with the air handling and distribution system running.

5.8.3. BUILDING AUTOMATION SYSTEM. Provide a Building Automation System consisting of a building control network , and integrate the building control network into the UMCS as specified.

The building control network shall be a single complete non-proprietary Direct Digital Control (DDC) system for control of the heating, ventilating and air conditioning (HVAC) systems as specified herein. The building control network shall be an Open implementation of LONWORKS® technology using ANSI/EIA 709.1B as the only communications protocol and use only LonMark Standard Network Variable Types (SNVTs), as defined in the LonMark® Resource Files, for communication between DDC Hardware devices to allow multi-vendor interoperability.

5.8.3.1. The building automation system shall be open in that it is designed and installed such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without further dependence on the original Contractor. This includes, but is not limited to the following:

- (a) Install hardware such that individual control equipment can be replaced by similar control equipment from other equipment manufacturers with no loss of system functionality.
- (b) Necessary documentation (including rights to documentation and data), configuration information, configuration tools, programs, drivers, and other software shall be licensed to and otherwise remain with the Government such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without subsequent or future dependence on the Contractor.

5.8.3.2. All DDC Hardware shall:

- (a) Be connected to a TP/FT-10 ANSI/EIA 709.3 control network.
- (b) Communicate over the control network via ANSI/EIA 709.1B exclusively.
- (c) Communicate with other DDC hardware using only SNVTs
- (d) Conform to the LonMark® Interoperability Guidelines.
- (e) Be locally powered; link power (over the control network) is not acceptable.
- (f) Be fully configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself to support the application. All settings and parameters used by the application shall be configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself
- (g) Provide input and output SNVTs required to support monitoring and control (including but not limited to scheduling, alarming, trending and overrides) of the application. Required SNVTs include but are not limited to: SNVT outputs for all hardware I/O, SNVT outputs for all setpoints and SNVT inputs for override of setpoints.
- (h) To the greatest extent practical, not rely on the control network to perform the application..

5.8.3.3. Controllers shall be Application Specific Controllers whenever an ASC suitable for the application exists. When an ASC suitable for the application does not exist use programmable controllers or multiple application specific controllers.

5.8.3.4. Application Specific Controllers shall be LonMark Certified whenever a LonMark Certified ASC suitable for the application exists. For example, VAV controllers must be LonMark certified.

5.8.3.5. Application Specific Controllers (ASCs) shall be configurable via an LNS plug-in whenever t an ASC with an LNS plug-in suitable for the application exists.

5.8.3.6. Each scheduled system shall accept a network variable of type SNVT_occupancy and shall use this network variable to determine the occupancy mode. If the system has not received a value to this network variable for more than 60 minutes it shall default to a configured occupancy schedule.

5.8.3.7. Gateways may be used provided that each gateway communicates with and performs protocol translation for control hardware controlling one and only one package unit.

5.8.3.8. Not Used

5.8.3.9. Perform all necessary actions needed to fully integrate the building control system. These actions include but are not limited to:

- Configure M&C Software functionality including: graphical pages for System Graphic Displays including overrides, alarm handling, scheduling, trends for critical values needing long-term or permanent monitoring via trends, and demand limiting.
- Install IP routers or ANSI/CEA-852 routers as needed to connect the building control network to the UMCS IP network. Routers shall be capable of configuration via DHCP and use of an ANSI/CEA-852 configuration server but shall not rely on these services for configuration. All communication between the UMCS and building networks shall be via the ANSI/CEA-709.1B protocol over the IP network in accordance with ANSI/CEA-852.

5.8.3.10. Provide the following to the Government for review prior to acceptance of the system:

- The latest version of all software and user manuals required to program, configure and operate the system.
- Points Schedule drawing that shows every DDC Hardware device. The Points Schedule shall contain the following information as a minimum:
 - Device address and NodeID.
 - Input and Output SNVTs including SNVT Name, Type and Description.
 - Hardware I/O, including Type (AI, AO, BI, BO) and Description.
 - Alarm information including alarm limits and SNVT information.
 - Supervisory control information including SNVTs for trending and overrides.
 - Configuration parameters (for devices without LNS plug-ins) Example Points Schedules are available at <https://eko.usace.army.mil/fa/besc/>
- Riser diagram of the network showing all network cabling and hardware. Label hardware with ANSI.CEA-709.1 addresses, IP addresses, and network names.
- Control System Schematic diagram and Sequence of Operation for each HVAC system.
- Operation and Maintenance Instructions including procedures for system start-up, operation and shut-down, a routine maintenance checklist, and a qualified service organization list.
- LONWORKS® Network Services (LNS®) database for the completed system.
- Quality Control (QC) checklist (below) completed by the Contractor's Chief Quality Control (QC) Representative

Table 5-1: QC Checklist

Instructions: Initial each item, sign and date verifying that the requirements have been met.		
#	Description	Initials
1	All DDC Hardware is installed on a TP/FT-10 local control bus.	
2	Communication between DDC Hardware is only via EIA 709.1B using SNVTs. Other protocols and network variables other than SNVTs have not been used.	
3	All sequences are performed using DDC Hardware.	
4	LNS Database is up-to-date and accurately represents the final installed system	
5	All software has been licensed to the Government	
6	M&C software monitoring displays have been created for all building systems, including all override and display points indicated on Points Schedule drawings.	
7	Final As-built Drawings accurately represent the final installed system.	
8	O&M Instructions have been completed and submitted.	
9	Connections between the UMCS IP network and ANSI/CEA-709.1B building networks are through ANSI/CEA-852 Routers.	
By signing below I verify that all requirements of the contract, including but not limited to the above, been met.		
Signature: _____ Date: _____		

5.8.3.11. Perform a Performance Verification Test (PVT) under Government supervision prior to system acceptance. During the PVT demonstrate that the system performs as specified, including but not limited to demonstrating that the system is Open and correctly performs the Sequences of Operation.

5.8.3.12. Provide a 1 year unconditional warranty on the installed system and on all service call work. The warranty shall include labor and material necessary to restore the equipment involved in the initial service call to a fully operable condition.

5.8.3.13. Provide training at the project site on the installed building system. Upon completion of this training each student, using appropriate documentation, should be able to start the system, operate the system, recover the system after a failure, perform routine maintenance and describe the specific hardware, architecture and operation of the system.

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5.8.4. TESTING, ADJUSTING AND BALANCING. Test and balance air and hydronic systems, using a firm certified for testing and balancing by the Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB), or the Testing Adjusting, and Balancing Bureau (TABB). The prime contractor shall hire the TAB firm directly, not through a subcontractor. Perform TAB in accordance with the requirements of the standard under which the TAB Firm's qualifications are approved, i.e., AABC MN-1, NEBB TABES, or SMACNA HVACTAB unless otherwise specified herein. All recommendations and suggested practices contained in the TAB Standard shall be considered mandatory. Use the provisions of the TAB Standard, including checklists, report forms, etc., as nearly as practicable to satisfy the Contract requirements. Use the TAB Standard for all aspects of TAB, including qualifications for the TAB Firm and Specialist and calibration of TAB instruments. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the TAB Standard, adhere to the manufacturer's recommendations. All quality assurance provisions of the TAB Standard such as performance guarantees shall be part of this contract. For systems or system components not covered in the TAB Standard, the TAB Specialist shall develop TAB procedures. Where new procedures, requirements, etc., applicable to the Contract requirements have been published or adopted by the body responsible for the TAB Standard used (AABC, NEBB, or TABB), the requirements and recommendations contained in these procedures and requirements are mandatory.

5.8.5. COMMISSIONING: Commission all HVAC systems and equipment, including controls, and all systems requiring commissioning for LEED Enhanced commissioning, in accordance with ASHRAE Guideline 1.1, ASHRAE Guideline 0 and LEED. Do not use the sampling techniques discussed in ASHRAE Guideline 1.1 and in ASHRAE Guideline 0. Commission 100% of the HVAC controls and equipment. Hire the Commissioning Authority (CA), certified as a CA by AABC, NEBB, or TABB, as described in Guideline 1.1. The CA will be an independent subcontractor to the contractor and not an employee or subcontractor of any other subcontractor on this project. The CA will not have business connections with any other party on the project. The CA will not have any other role or responsibilities outside of commissioning activities. The CA will communicate and report directly to the Government in the execution of the commissioning activities. The Contracting Officer's Representative will act as the Owner's representative in performance of duties spelled out under OWNER in Annex F of ASHRAE Guideline 0. All buildings with Minimum LEED Silver (or better) requirement will earn LEED Credit EA3 Enhanced Commissioning.

5.9. ENERGY CONSERVATION

5.9.1. The building including the building envelope, HVAC systems, service water heating, power, and lighting systems shall meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Substantiation requirements are defined in Section 01 33 16, Design After Award.

5.9.2. Design all building systems and elements to meet the minimum requirements of ANSI/ASHRAE/IESNA 90.1. Design the buildings, including the building envelope, HVAC systems, service water heating, power, and lighting systems to achieve an energy consumption that is at least 40% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1. Energy calculation methodologies and substantiation requirements are defined in Section 01 33 16, Design After Award.

5.9.3. Purchase Energy Star products, except use FEMP designated products where FEMP is applicable to the type product. The term "Energy Star product" means a product that is rated for energy efficiency under an Energy Star program. The term "FEMP designated product" means a product that is designated under the Federal Energy

Management Program of the Department of Energy as being among the highest 25 percent of equivalent products for energy efficiency. When selecting integral sized electric motors, choose NEMA PREMIUM type motors that conform to NEMA MG 1, minimum Class F insulation system. Motors with efficiencies lower than the NEMA PREMIUM standard may only be used in unique applications that require a high constant torque speed ratio (e.g., inverter duty or vector duty type motors that conform to NEMA MG 1, Part 30 or Part 31).

5.9.4. Solar Hot Water Heating. Provide at least 30% of the domestic hot water requirements through solar heating methodologies, unless the results of a Life Cycle Cost Analysis (LCCA) developed utilizing the Building Life Cycle Cost Program (BLCC) which demonstrates that the solar hot water system is not life cycle cost effective in comparison with other hot water heating systems. The type of system will be established during the contract or task order competition and award phase, including submission of an LCCA for government evaluation to justify non-selection of solar hot water heating. The LCCA uses a study period of 25 years and the Appendix K utility cost information. The LCCA shall include life cycle cost comparisons to a baseline system to provide domestic hot water without solar components, analyzing at least three different methodologies for providing solar hot water to compare against the baseline system.

5.9.5. Process Water Conservation. When potable water is used to improve a building's energy efficiency, employ lifecycle cost effective water conservation measures, except where precluded by other project requirements.

5.9.6. Renewable Energy Features. The Government's goal is to implement on-site renewable energy generation for Government use when lifecycle cost effective. See Paragraph 6, PROJECT SPECIFIC REQUIREMENTS for renewable energy requirements for this project.

5.10. FIRE PROTECTION

5.10.1. STANDARDS AND CODES Provide the fire protection system conforming to APPLICABLE CRITERIA.

5.10.2. Inspect and test all fire suppression equipment and systems, fire pumps, fire alarm and detection systems and mass notification systems in accordance with the applicable NFPA standards. The fire protection engineer of record shall witness final tests. The fire protection engineer of record shall certify that the equipment and systems are fully operational and meet the contract requirements. Two weeks prior to each final test, the contractor shall notify, in writing, the installation fire department and the installation public work representative of the test and invite them to witness the test.

5.10.3. Fire Extinguisher Cabinets: Provide fire extinguisher cabinets and locations for hanging portable fire extinguishers in accordance with NFPA 10 Standard for Portable Fire Extinguishers.

5.10.4. Fire alarm and detection system: Required fire alarm and detection systems shall be the addressable type. Fire alarm initiating devices, such as smoke detectors, heat detectors and manual pull stations shall be addressable. When the system is in alarm condition, the system shall annunciate the type and location of each alarm initiating device. Sprinkler water flow alarms shall be zoned by building and by floor. Supervisory alarm initiating devices, such as valve supervisory switches, fire pump running alarm, low-air pressure on dry sprinkler system, etc. shall be zoned by type and by room location.

5.10.5. Fire Protection Engineer Qualifications: In accordance with UFC 3-600-01, FIRE PROTECTION ENGINEERING FOR FACILITIES, the fire protection engineer of record shall be a registered professional engineer (P.E.) who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveys (NCEES), or a registered P.E. in a related engineering discipline with a minimum of 5 years experience, dedicated to fire protection engineering that can be verified with documentation.

5.11. SUSTAINABLE DESIGN

5.11.1. STANDARDS AND CODES: Sustainable design shall conform to APPLICABLE CRITERIA. See paragraph 6, PROJECT-SPECIFIC REQUIREMENTS for which version of LEED applies to this project. The LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects (AGMBC) applies to all projects. Averaging may be used for LEED compliance as permitted by the AGMBC but is restricted to only those buildings included in this project. Each building must individually comply with the requirements of paragraphs ENERGY CONSERVATION and BUILDING WATER USE REDUCTION.

5.11.2. LEED RATING, REGISTRATION, VALIDATION AND CERTIFICATION: See Paragraph PROJECT-SPECIFIC REQUIREMENTS for project minimum LEED rating/achievement level, for facilities that are exempt from the minimum LEED rating, for LEED registration and LEED certification requirements and for other project-specific information and requirements.

5.11.2.1. Innovation and Design Credits. LEED Innovation and Design (ID) credits are acceptable only if they are supported by formal written approval by GBCI (either published in USGBC Innovation and Design Credit Catalog or accompanied by a formal ruling from GBCI). LEED ID credits that require any Owner actions or commitments are acceptable only when Owner commitment is indicated in paragraph PROJECT-SPECIFIC REQUIREMENTS or Appendix LEED Project Credit Guidance

5.11.3. OPTIMIZE ENERGY PERFORMANCE. : Project must earn, as a minimum, the points associated with compliance with paragraph ENERGY CONSERVATION. LEED documentation differs from documentation requirements for paragraph ENERGY CONSERVATION and both must be provided. For LEED-NC v2.2 projects you may substitute ASHRAE 90.1 2007 Appendix G in its entirety for ASHRAE 90.1 2004 in accordance with USGBC Credit Interpretation Ruling dated 4/23/2008.

5.11.4. COMMISSIONING. See paragraph 5.8.5 COMMISSIONING for commissioning requirements. USACE templates for the required Basis of Design document and Commissioning Plan documents are available at <http://en.sas.usace.army.mil> (click on Engineering Criteria) and may be used at Contractor's option.

5.11.5. DAYLIGHTING. Except where precluded by other project requirements, do the following in at least 75 percent of all spaces occupied for critical visual tasks: achieve a 2 percent glazing factor (calculated in accordance with LEED credit EQ8.1) OR earn LEED Daylighting credit, provide appropriate glare control and provide either automatic dimming controls or occupant-accessible manual lighting controls.

5.11.6. LOW-EMITTING MATERIALS. Except where precluded by other project requirements, use materials with low pollutant emissions, including but not limited to composite wood products, adhesives, sealants, interior paints and finishes, carpet systems and furnishings,

5.11.7. CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT. Except where precluded by other project requirements, earn LEED credit EQ 3.1 Construction IAQ Management Plan, During Construction and credit EQ 3.2 Construction IAQ Management Plan, Before Occupancy.

5.11.8. RECYCLED CONTENT. In addition to complying with section RECYCLED/RECOVERED MATERIALS, earn LEED credit MR4.1, Recycled Content, 10 percent except where precluded by other project requirements.

5.11.9. BIOBASED AND ENVIRONMENTALLY PREFERABLE PRODUCTS. Except where precluded by other project requirements, use materials with biobased content, materials with rapidly renewable content, FSC certified wood products and products that have a lesser or reduced effect on human health and the environment over their lifecycle to the maximum extent practicable.

5.11.10. FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM (FB4P). The Farm Security and Rural Investment Act (FSRIA) of 2002 required the U.S. Department of Agriculture (USDA) to create procurement preferences for biobased products that are applicable to all federal procurement (to designate products for biobased content). For all designated products that are used in this project, meet USDA biobased content rules for them except use of a designated product with USDA biobased content is not required if the biobased product (a) is not available within a reasonable time, (b) fails to meet performance standard or (c) is available only at an unreasonable price. For biobased content product designations, see <http://www.biopreferred.gov/ProposedAndFinalItemDesignations.aspx>.

5.12. CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT: Achievement of 50% diversion, by weight, of all non-hazardous C&D waste debris is required. Reuse of excess soils, recycling of vegetation, alternative daily cover, and wood to energy are not considered diversion in this context, however the Contractor must track and report it. A waste management plan and waste diversion reports are required, as detailed in Section 01 57 20.00 10, ENVIRONMENTAL PROTECTION.

5.13. SECURITY (ANTI-TERRORISM STANDARDS): Unless otherwise specified in Project Specific Requirements, only the minimum protective measures as specified by the current Department of Defense Minimum

Antiterrorism Standards for Buildings, UFC 4-010-01, are required for this project. The element of those standards that has the most significant impact on project planning is providing protection against explosives effects. That protection can either be achieved using conventional construction (including specific window requirements) in conjunction with establishing relatively large standoff distances to parking, roadways, and installation perimeters or through building hardening, which will allow lesser standoff distances. Even with the latter, the minimum standoff distances cannot be encroached upon. These setbacks will establish the maximum buildable area. All standards in Appendix B of UFC 4-010-01 must be followed and as many of the recommendations in Appendix C that can reasonably be accommodated should be included. The facility requirements listed in these specifications assume that the minimum standoff distances can be met, permitting conventional construction. Lesser standoff distances (with specific minimums) are not desired, however can be provided, but will require structural hardening for the building. See Project Specific Requirements for project specific siting constraints. The following list highlights the major points but the detailed requirements as presented in Appendix B of UFC 4-010-01 must be followed.

- (a) Standoff distance from roads, parking and installation perimeter; and/or structural blast mitigation
- (b) Blast resistant windows and skylights, including glazing, frames, anchors, and supports
- (c) Progressive collapse resistance for all facilities 3 stories or higher
- (d) Mass notification system (shall also conform to UFC 4-021-01, Mass Notification Systems)
- (e) For facilities with mailrooms (see paragraph 3 for applicability) – mailrooms have separate HVAC systems and are sealed from rest of building

6.0 PROJECT SPECIFIC REQUIREMENTS

6.1. GENERAL

The requirements of this paragraph augment the requirements indicated in Paragraphs 3 through 5.

6.2. APPROVED DEVIATIONS

The following are approved deviations from the requirements stated in Paragraphs 3 through 5 that only apply to this project.

6.2.1 All references in this document to Uniform Federal Accessibility Standards (UFAS) shall be considered as replaced with reference to Architectural Barriers Act Accessibility Guidelines (ABAAG). Current references to Americans With Disabilities Act Accessibility Guidelines (ADAAG) shall likewise be substituted. This deviation is all-inclusive to ensure compliance with the Deputy Secretary of Defense Memorandum dated October 31, 2008, Subject: Access for People with Disabilities. **IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL PROPOSALS ARE FULLY COMPLIANT WITH THE REQUIREMENTS SET FORTH BY THE ABOVE-REFERENCED ACCESSIBILITY REGULATIONS.**

6.2.2 In the event of a conflict between this Paragraph and Paragraph 3, the requirements in this Paragraph shall take precedence over the requirements of Paragraph 3.

6.2.3 In addition to the requirements currently in 3.6.1.7.2 and 3.6.1.7.3 Child Activity Room Toilet Area: The faucets in the toilet area (NOT the sinks in the food prep/arts and crafts area) shall be pre-mixed single push control that meets ADA requirements. Water shall run for 15 seconds.

There are no other approved deviations.

6.3. SITE PLANNING AND DESIGN

6.3.1. General:

The Design-Build Contractor shall be responsible for the complete and final integration of the Soldier & Family Assistance Center (SFAC) building site, the Playground Area and the Administrative Headquarters (ADMIN-HQ) building site into the overall developed Warrior in Transition Complex. This shall include all Antiterrorism and Force Protection (AT/FP) measures, utility connections, extension of sidewalks, paving, landscaping and any and all other necessary construction required to provide a complete, functional and operational building and accessories.

The Barracks and overall site work to within five (5) feet of SFAC and ADMIN-HQ building footprint shall be performed by a separate Design-Build Contractor. This Design-Build Contractor shall coordinate all work with the separate Design-Build Contractor.

A building pad site extending five (5) feet horizontally beyond the SFAC and ADMIN-HQ building footprint are to be graded by the separate Design-Build Contractor to the finish floor elevation as shown on separate Design-Build Contractor's Final Site Plan for delivery to this Design-Build Contractor. The Playground Area site extending sixty (60) feet horizontally away from and along the full length of the SFAC pad site is to be graded by the separate Design-Build Contractor to the finish floor elevation of the SFAC as shown on the Design-Build Contractor's Final Site Plan for delivery to this Design-Build

Contractor.

The Design-Build Contractor shall accept the site as delivered and be solely responsible for any investigations required to accommodate any and all of the Design-Builder Contractor's designs, including building foundation(s), and any other site design features as may be required by the Design-Build Contractor's final geotechnical report. Excess soil or rock may not be wasted within the project limits.

Final finish floor elevation of any building shall be higher than the highest finished adjacent exterior grade elevation. Exterior finish grade shall slope down and away from each building at a maximum of four-percent (4%) for the first five (5) feet, and a minimum of five-percent (5%) slope for the next five (5) feet. If a swale is required to direct storm water runoff around and away from the buildings, the maximum high water elevation in the swale from a one-percent (1%) return frequency storm shall be a minimum one (1) foot below the finish floor elevation. All supporting calculations shall be submitted in support of final plans. These slope requirements are superseded by ADA accessibility requirements where applicable.

6.3.1.1. Limits of Construction

The limits of construction are defined by the building pad sites. The staging area and laydown area will be located beyond the Limits of Construction. The final location of all staging and laydown areas shall be coordinated with the separate Design-Build Contractor and approved by the Contracting Officer.

6.3.1.2. Fire Suppression Supply Line

A separate Design-Build Contractor shall provide a fire suppression line of adequate size and capacity to a point within five (5) feet of the buildings. The separate Design-Build Contractor shall coordinate the location of the point of termination of the fire supply line with the Design-Build Contractor for the SFAC and ADMIN-HQ buildings. A separate line is required for each building

6.3.1.3. Fire Sprinkler Service

One separate fire sprinkler service connection is to be provided within each building. The Design-Build Contractor shall be responsible for all piping between the building and the end(s) of the fire suppression supply line as installed by the separate Design-Build Contractor. The Design-Build Contractor shall provide and install the PIV for the buildings. Coordinate with Fire Department, site contractor, and project manager.

6.3.1.4. Fire Protection Service Line

The Design-Build Contractor shall be responsible for connection of the of the fire sprinkler supply lines to the service stub provided by the separate Design-Build Contractor.

6.3.1.5. Existing Underground Utilities

No utilities are permitted to be abandoned in place within a fifteen (15) foot envelope surrounding a building foundation. Said utilities are required to be removed, and the excavation backfilled and compacted in accordance with specifications developed by the Design-Build Contractor's geotechnical report.

6.3.2. Site Structures and Amenities

6.3.2.1. Sidewalks

The Design-Build Contractor shall be responsible for the connection of the building sidewalks to the sidewalk network. All sidewalks shall be ADA compatible.

6.3.2.2. Landscape Plan

The successful Design-Build Contractor shall provide a Landscape Plan addressing landscape treatment to the area located between the exterior building wall and the surrounding five (5) foot building envelope with the acceptable plant list found in Appendix I. The Landscape Plan shall be designed to visually enhance the new facilities with color, form and screening, while providing shade and windbreak for the building. Xeriscape plantings shall consist of low maintenance, low water plants installed in plant beds or areas. All landscaping plants should include coordination with Fort Leonard Wood Directorate of Public Works (DPW), Environmental Division. Unhealthy or dead plants shall be removed immediately and replaced as seasonal conditions permit. Furnished plant material shall be guaranteed to be in a vigorous growing condition for a minimum period of twelve (12) months regardless of contract time period. Plant establishment period shall continue until twelve (12) months from the Beneficial Occupancy Date of the last building.

6.3.2.3. Antiterrorism

The facility shall be designed based on the facility threat security level to protect against exterior attack by providing standoff distance between an aggressor or bomb and a facility, provide barriers as necessary and facilitate visual monitoring of the site as more fully described in UFC 4-010-10.

6.3.2.4. Playground Area

The successful Design-Build Contractor shall provide a Playground Area Plan addressing the playground area adjacent to the SFAC. The outdoor playground area of fifty (50) feet by sixty (60) feet shall be directly accessible at two locations from the Child Activity Room. The playground area should encourage free play and present multiple opportunities to develop motor skills, physical fitness and social interaction. The area shall be accessible to children with handicaps and shall be inclusive to allow children with disabilities to participate in activities with all children. The Playground Area shall include a minimum twenty-six (26) foot by twenty-three (23) foot area with a composite play system for ages 2 to 5, a shade structure of minimum of twelve (12) feet by twelve (12) feet, a minimum twenty (20) foot by sixteen (16) foot asphalt area with full size basketball goal, and two benches all to be interconnected by four (4) foot sidewalks. The playground shall be designed based upon playground building code standards including fall space requirements, the playground shall be certified played and conducted by contractor.

6.3.3. Site Functional Requirements:

6.3.3.1. Stormwater Management (SWM) Systems.

Storm water discharge from roof drains and downspouts shall discharge onto turfed areas. Discharge velocity shall be controlled as necessary to prevent erosion. Roof drains and downspouts may connect to the enclosed storm sewer system if sufficient excess system capacity exists.

6.3.3.2. Erosion and Sediment Control

Not used.

6.3.3.3. Vehicular Circulation.

Not used.

6.4. SITE ENGINEERING

6.4.1. Existing Topographical Conditions

A topographic map and site utility survey (Site Survey) for this site has been prepared by the Government and is included as part of this RFP (see Appendix J). Any discrepancies which are found in the Government furnished drawings shall be brought to the attention of the Contracting Officer. The Contracting Officer will provide horizontal and vertical control benchmarks and monuments within Fort Leonard Wood for the Design-Build Contractor's use. All drawings produced by the Design-Build Contractor shall be referenced to said control points. The Design-Build Contractor shall verify and survey the site as required to complete the design and construction of the facilities.

6.4.1.1. The Design-Build Contractor shall be responsible for design and construction of all site facilities within the five (5) foot building envelope surrounding the SFAC and HQ-ADMIN building sites and to provide connections to all site services installed by the separate Design-Build Contractor. All design and construction shall conform to all USACE, Federal, State, County and Fort Leonard Wood design criteria and specifications and any additional requirements as may be specified therein. Wherever there is conflict, the most restrictive criteria or specification shall apply.

6.4.1.2. The Design-Build Contractor shall accept the site as is and in accordance with 6.3.1 and be solely responsible for any investigations required to accommodate any and all of the Design-Build Contractor's design, including building foundation(s) and other site features as may be required by the Design-Build Contractor's final geotechnical report. Excess soil or rock may not be wasted within the project limits without the written approval of the Contracting Officer.

6.4.1.3. The Design-Build Contractor will be allotted an area for the placement of a construction trailer complex and storage for the Design-Build Contractor and their Sub-Contractors. Permanent trailers will not be permitted within the building envelope work areas. The Design-Build Contractor shall be responsible for the site preparation, fencing, access drives, and maintenance of his compound at all times. A connection point for electricity, telephone, water and sanitary sewer will be available.

6.4.1.4. The Design-Build Contractor should assume they will be responsible for providing temporary utilities (water, sewer, and electricity, etc.) during construction at the project site. A water fill point will be coordinated with the Contracting Officer. Installation and maintenance of the haul road from the water fill point to the entrance of the construction site will be the responsibility of the Design-Build Contractor. Routing of haul roads shall be coordinated with the Contracting Officer. The Design-Build Contractor shall be responsible for obtaining permits from Fort Leonard Wood for each generator required for on-site electrical service. Please note that generators equal to or larger than 500 hp in use for more than one year require a permit from Fort Leonard Wood.

6.4.1.5. The Design-Build Contractor shall be responsible for the placement of the buildings within the footprints as shown on the drawings. The Design-Build Contractor shall be responsible for coordinating the design of the SFAC and ADMIN-HQ with the separate Design-Build Contractor. The Design-Build Contractor shall be responsible for the location of the facilities on their respective parcels of land. The connection to the surrounding walkways, courtyards, gathering areas, site amenities, and parking areas and the installation of these items within the site constraints shall be the responsibility of the Design-Build Contractor. The Design-Build Contractor shall be responsible for connection of all utilities from the

building to the service connection point provided. The separate Design-Build Contractor shall ensure that, to the extent feasible, all points of connection are easily available and accessible to the pad sites when needed. In the event of a dispute, the Contracting Officer shall have final determination as to what is acceptable.

6.4.1.6. Upon finalizing of the building footprints, the Design-Build Contractor shall provide proposed building footprints, site orientation, and requests for deviations from the drawings to the Contracting Officer for approval. The Contracting Officer will enforce coordination of buildings and finalize the placement of the buildings within the drawings boundaries and finalize associated site grading around the facilities; however the Design-Build Contractor shall be responsible for coordination efforts with work by others on adjacent sites. Building placement within the building envelope may be modified by the Contracting Officer if deemed necessary.

6.4.2. Existing Geotechnical conditions: See Appendix A for a preliminary geotechnical report.

6.4.2.1. The preliminary geotechnical report is based upon the best available data at the time the RFP document was prepared. As such, the preliminary report provides a general overview of the soil and geologic conditions anticipated at the project site. This information should be used for early planning and preliminary design only.

6.4.2.2. The successful Design-Build Contractor shall conduct and prepare the Final Geotechnical investigation and Report in accordance with standard engineering principles and practices. Said report shall be of sufficient detail to accurately characterize site conditions, provide final design parameters for utility excavation and installation, foundations, floor slabs, retaining walls, embankments, surface and subsurface drainage and pavements. In the report, provide a log of each boring that includes as a minimum a clear description of each soil type encountered, the elevations at which changes in material occur, ground water levels, and the elevations of rock including the start of competent bedrock suitable as a bearing surface for foundations. Any mitigation requirements for foundations, floor slabs and pavements due to expansive soils to be addressed.

The successful Design-Build Contractor shall be responsible for obtaining additional geotechnical data as necessary to support his design.

6.4.3. Fire Flow Tests See Appendix D for results of fire flow tests to use for basis of design for fire flow and domestic water supply requirements.

6.4.3.1. The fire flow test for this site has been done by the Government and is included as part of this RFP. The fire flow test results reflect the existing water distribution system at the time the RFP document was prepared. This information should be used for early planning and preliminary design.

6.4.3.2. The successful Design-Build Contractor shall be responsible for the fire flow test(s) to be used for final design and construction. Said test(s) to be performed in accordance with standard engineering principles, practices and applicable AWWA standards (see Section 01 10 00, 4.1). Said test results shall be of sufficient detail to accurately characterize site conditions and shall provide final design parameters.

6.4.4. Pavement Engineering and Traffic Estimates:

Not used.

6.4.5. Traffic Signage and Pavement Markings

Not used.

6.4.6. Base Utility Information

The location of existing utilities is provided by the Government on the site survey (see Appendix J). Any discrepancies which are found in the furnished drawings shall be brought to the attention of the Contracting Officer.

6.4.6.1. Utility Information is to be coordinated and planned with the Directorate of Public Works through the Contracting Officer. The site utility plans provide utility specific locations. All existing above ground utility lines that are unused on the site shall be removed. All existing underground utility lines that are unused shall be removed or abandoned in place as described elsewhere in this RFP.

6.4.6.2. The Design-Build Contractor shall field verify the location, size and depth of any and all utilities prior to commencement of any activities on site. Coordinate with Contracting Officer and notify immediately of any discrepancy with utility locations as provided on the drawings. The Design-Build Contractor is responsible for any and all damage to utility lines, structures and appurtenances within or adjacent to the project limits caused by any construction activities.

6.4.6.3. Prior to final design, the Design-Build Contractor shall coordinate with the drawings on the location and sizes of utility service. One connection point for each utility is to be provided for each building.

6.4.6.4. Demarcation - The Design-Build Contractor shall verify and coordinate demarcation lines and project limits with the drawings and other Design-Build Contractors as required.

6.4.6.5. Temporary Utilities - The Design-Build Contractor is responsible for providing their own utilities at the construction site.

6.4.6.6. Metering – The Design-Build Contractor shall be responsible for coordination of proper location and installation with the Contracting Officer and the respective utility companies.

6.4.6.7. Site Electrical Distribution - Power for buildings is to be provided from distribution transformers. Electric meters shall be located as required by the electric utility company.

Electrical service on this installation is privatized:

Laclede Electric Cooperative
24450 Southside Road
Waynesville, MO 65583
(573) 774-2281

For electrical service information contact:

Larry Slinkard
Directorate of Public Works
1334 1st St.
Ft. Leonard Wood, MO 65473-8944
(573) 596-6027

6.4.6.8. Water Distribution System - The water distribution system on this installation is owned, operated and maintained by Fort Leonard Wood.

For water service information contact:

Keith Pendleton
Directorate of Public Works
1334 1st St.

Ft. Leonard Wood, MO 65473-8944
(573) 596-1179

6.4.6.9. Sanitary Sewer Main - The sanitary sewer service to this site is owned, operated and maintained by Fort Leonard Wood.

For sanitary sewer service information contact:

Keith Pendleton
Directorate of Public Works
1334 1st St.
Ft. Leonard Wood, MO 65473-8944
(573) 596-1179

6.4.6.10. Storm Water Management - The storm water system is owned, operated and maintained by Fort Leonard Wood.

For storm sewer system information contact:

Shannon Kelly
Directorate of Public Works
East 2nd Street
Building 2101
Ft. Leonard Wood, MO 65473-8944

6.4.6.11. Natural Gas Service - The owner and operator of the natural gas distribution system at Ft. Leonard Wood (Omega Pipeline Company, LLC) shall provide the underground natural gas service to the new facilities, up to and including the meter/regulator set (2 psig delivery) to be located immediately outside the mechanical room that houses the natural gas fired equipment. The Design-Build Contractor shall be responsible for connection to the meter/regulator and responsible for providing and installing any interior reducing regulators as required for the gas operating equipment.

Gas service on this installation is privatized:

Omega Pipeline Company, LLC
299 Ordinance Drive, #2570
Fort Leonard Wood, MO 65473
573-329-3382

For gas service information contact:

Earl Bivens
Directorate of Public Works
1334 1st St.
Ft. Leonard Wood, MO 65473-8944
(573) 596-0214

6.4.6.12. Cable TV - End user will contract with cable provider (likely Cable America). D/B Contractor will place cable, conduit, boxes, and connectors (with-in the facility and the utility room for hookup from cable provider) and conduit to 5 feet beyond the exterior wall.

6.4.7. Cut and Fill

[Not Supplied - PS_SiteEngineering_CutFill : SITE_CUT]

6.4.8. Borrow Material

There are NO disposal sites or borrow materials available for the contractor on this RFP. Irregardless of other documentation in this RFP these are NOT available.

6.4.9. Haul Routes and Staging Areas

Approved designated haul routes and staging areas are in the RFP (see appendices).

6.4.10. Clearing and Grubbing:

Not used.

6.4.11. Landscaping:

The Design-Build Contractor shall coordinate a landscaping design with the acceptable plant list found in the RFP (Appendix I). The site shall continue the landscape theme of surrounding areas. The use of plant materials to promote sustainability of the facility is encouraged. Shrubs, groundcovers, and vines provide aesthetic appeal as well as preservation of fauna and flora, conservation, climate modification, erosion control, air purification and noise abatement. All plantings shall be per the Plant Suitability Matrix within Appendix I. Mulch shall be placed around all shrubs and ground cover planter beds. Mass planting of shrubs should receive four inches (4") of mulch in a three foot (3') ring around each plant. The approved wood mulch shall be a fibrous, shaven hardwood material uniformly sized and shaped and free of weeds, leaves and bark. All irrigation for plantings shall be by a drip system. Steel or plastic edging will not be permitted.

A cement mowing strip of a minimum one (1) foot in width should encompass all facilities.

6.4.12. Turf:

All turf areas shall be per Approved Plants List that is included in the RFP (see appendices).

6.5. ARCHITECTURE

6.5.1. General: To the maximum extent possible within the contract cost limitation, the buildings shall conform to the look and feel of the architectural style and shall use the same colors as adjacent facilities as expressed herein. The Government will evaluate the extent to which the proposal is compatible with the architectural theme expressed in the RFP during the contract or task order competition. The first priority in order of importance is that the design provides comparable building mass, size, height, and configuration compared to the architectural theme expressed herein. The second priority is that design is providing compatible exterior skin appearance based upon façade, architectural character (period or style), exterior detailing, matching nearby and installation material/color pallets, as described herein.

6.5.2. Design

6.5.2.1. Appendix F is provided "For Information Only", to establish the desired site and architectural themes for the area. Appendix F identifies the desired project look and feel based on Fort Leonard Wood's Installation Architectural Theme from existing and proposed adjacent building forms; i.e. building exterior skin, roof lines, delineation of entrances, proportions of fenestration in relation to elevations, shade and shadow effects, materials, textures, exterior color schemes, and organizational layout.

6.5.2.2. The design should address Fort Leonard Wood's identified preferences. Implement these preferences considering the following:

- (a) Achievable within the Construction Contract Cost Limitation (CCL)
- (b) Meets Milestones within Maximum Performance Duration.
- (c) Achieves Full Scope indentified in this Solicitation
- (d) Best Life-Cycle Cost Design
- (e) Meets the Specified Sustainable Design and LEED requirements
- (f) Complies with Energy Conservation Requirements Specified in this RFP.

6.5.2.3. Priority #1. Visual Compatibility: Facility Massing (Size, Height, Spacing, Architectural Theme, etc.) Exterior Aesthetic Considerations: The buildings massing, exterior functional aesthetics, and character shall create

a comprehensive and harmonious blend of design features that are sympathetic to the style and context of the Installation. The Installation's intent for this area is:

The Installation's intent for this project is to match the architectural theme for the complex which has been established during the barracks phase of construction. Site and Architectural conceptual drawings that meet this objective are shown in Appendix F.

6.5.2.4. Priority #2. Architectural Compatibility: Exterior Design Elements (Materials, Style, Construction Details, etc.) Roofs, Exterior Skin, and Windows & Door Fenestrations should promote a visually appealing compatibility with the desired character while not sacrificing the integrity and technical competency of building systems.

6.5.2.5. See Appendix F for exterior colors that apply to Architectural character at Fort Leonard Wood. The manufacturers and materials referenced are intended to establish color only, and are not intended to limit manufacturers and material selections.

6.5.2.6. Additional architectural requirements:

(a) Install fall protection anchor points on all roofs with a slope greater than 2:12

(b) Provide durable materials that are easily maintained and replaced. Maximize use of day-lighting within the constraints of the applicable codes. The exterior elements of the facilities shall conform to the architectural theme of the barracks noted in Appendices.

(c) Exterior Doors and Frames: Door and frame installation shall comply with applicable code requirements. Color shall coordinate with existing adjacent facilities.

(d) Windows: Non-operable, blast resistant windows shall be used in all locations.

(e) Roofs:

(1) Pitched roof system design and materials shall coordinate with existing adjacent facilities, particularly nearby barracks.

(2) Roof Mounted Equipment: For roof mounted equipment, provide permanent access walkways and platforms to protect roof.

(3) Roof access from building exterior is prohibited.

(4) Any roof system used on this project shall have a minimum of 20 years unconditional warranty.

6.5.3. Programmable Electronic Key Card Access Systems:

Electronic card access system shall be compatible with the existing host BEST software. The system shall be capable of compartmentalized so that each building has only the capability to produce magnetic cards for that building. System shall be LAN capable. Locks shall have magnetic strip, track 3 card readers with EV and EV functions and a hard key override compatible with BEST/PEAK Kaba cores. Provide 2 encoders, a PDA, cable link and the capability to encode cards.

6.5.4. INTERIOR DESIGN

6.5.4.1 Interior Design Objectives: Arrange spaces in an efficient, functional manner. Provide circulation schemes that allow easy orientation within buildings. Provide durable materials and furnishings that are easily maintained and replaced. Maximize use of day- lighting within the constraints of the applicable

codes. Provide interior surfaces that are easy to clean and light in color. Design interiors with a residential ambience. D/B Contractor shall structure interior spaces to allow maximum flexibility for future modifications. Comply with the following guidelines for specific materials:

6.5.4.1.1. Floors: Comply with requirements of applicable codes. Provide durable flooring materials which comply with LEED criteria for low emitting materials.

6.5.4.1.2. Ceramic Tile: Comply with ANSI A137.1 and the recommendations of Tile Council of America (TCA) Handbook for Ceramic Tile Installation.

6.5.4.1.3. Interior Walls and Partitions: Comply with requirements of applicable codes. Where bathtubs/showers are installed back-to-back on both sides of a gypsum wallboard partition, the gypsum wallboard on both sides of the wall shall extend to the floor.

6.5.4.1.4. Metal Support Systems: Non-load bearing metal studs and furring shall comply with ASTM C 645; stud gauge shall be as required by height and loading. Metal framing and furring system shall be capable of carrying a transverse load of 5 psf without exceeding either allowable stress or a deflection of L/240. Design studs and connections for cabinets, equipment, and furnishings where they occur. Design shall be based on the steel stud properties only. Provide G60 minimum galvanized coating for interior application.

6.5.4.1.5. Gypsum Wallboard and Ceiling Board: Comply with ASTM C 36. Minimum panel thickness shall be 5/8 inch. Provide moisture resistant panels at locations subject to moisture. Glass-mat gypsum panels shall be used as substrate for ceramic tile wall applications except at showers where cementitious backer board shall be used. Joint treatment - ASTM C 475, Screws - ASTM C 646, Drywall Installation - ASTM C 840.

Interior building signage requirements:

Comply with requirements of ADAAG and ABAAG. Provide graphic interior room identification signage for the following spaces: Public toilet. Provide Room Number and Room Function signage for all rooms. Interior room signage will consist of a header strip with the room number (fixed) and a changeable two-line message strip insert panel. The insert panel shall be a clear sleeve that will accept paper or plastic insert with the name of the service or personnel. The insert shall be prepared typeset message photographically enlarged to size and mounted on paper card stock. Coordinate with user and installation facilities engineer (Directorate of Public Works). The sign shall be located on the strike side of the door. All signage must meet brail ADA requirements in all areas.

6.6. STRUCTURAL DESIGN

6.6.1 General

The Warriors In Transition Unit Administrative Services (WTUAS) and the Warriors In Transition Soldier and Family Assistance Center (SFAC) are single story buildings and shall comply with the COS standard templates. Consider mission effectiveness, the most economical system in the locality, life-cycle economics, and space adaptability in choosing the structural systems. Space adaptability includes future reorganization or reallocation of space.

Analyze, design, and detail the building as a complete structural system. Design structural elements to preclude damage to finishes, partitions, and other frangible, nonstructural elements; to prevent impaired

operability of moveable components; and to prevent cladding leakage and roof ponding. Limit deflections of structural members to the allowable of the applicable material standard, e.g. ACI, AISC, Brick Industry Association (BIA).

Consider climate conditions, humidity, industrial atmosphere, or other adverse conditions when selecting the type of cement and admixtures used in concrete, the concrete cover on reinforcing steel, the coatings on structural members, expansion joints, the level of corrosion protection, and the structural systems. Concrete strength shall be as required for application, shall not be less than 3,000 psi, and shall be reinforced. Place floor mounted mechanical and electrical equipment on a 4" minimum concrete pad. This is a "house keeping pad" on top of the main floor.

In addition to gravity, seismic, and lateral loads, design ancillary building items, e.g. doors, window jambs and connections, overhead architectural features and equipment bracing, for the requirements of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings. Ensure and document that the design of glazed items includes, but is not limited to, the following items under the design loads prescribed in UFC 4-010-01:

1. Supporting members of glazed elements, e.g. window jamb, sill, header
2. Connections of glazed element to supporting members, e.g. window to header
3. Connections of supporting members to each other, e.g. header to jamb
4. Connections of supporting members to structural system, e.g. jamb to foundation.

6.6.2 Applicable Standards, Codes, and Criteria

The structural design shall fully comply with the following listed criteria in addition to the provisions provided in Section 01 10 00 paragraph 4.0 Applicable Criteria. Use the latest edition of the International Building Code (IBC) and ASCE-7 for design guidance, and coordinate design with UFC 4-010-01, DOD Minimum Anti-terrorism standards for Buildings. Additionally, refer to UFC 3-310-01 Structural Load Data dated May-05 and to Table B-1 of the UFC. This UFC contains DOD uniform and concentrated live load minimum requirements. The most stringent code shall apply to the design.

6.6.3 Project Specific Design Loads:

6.6.3.1 Not Used

6.6.3.2. Ground Snow: 20 psf (include consideration for drift and rain-on-snow surcharge)

6.6.3.3. Wind Speed: 90 mph (3-second gust)

6.6.3.4. Frost Penetration: 36 inches

6.6.3.5. Seismic Design Data: The mapped maximum considered earthquake (MCE) spectral response accelerations for site class B are:

S_s (at short periods) = 30 % g

S_1 (at 1-second period) = 13 % g.

The acceleration values identified are for the general location of the facility. Verify and use site specific criteria based on the final site location of the facility. Adjust site class per IBC to match specific site information in geotechnical report.

6.6.3.6. Antiterrorism/Force Protection loads and minimum requirements are per UFC 4-010-01. For design of structural components subjected to dynamic loads, the U.S. Army Corps of Engineers Protective Design Center (PDC) developed SBEDS, Single-Degree-of-Freedom Blast Effects Design Spreadsheets (SBEDS). SBEDS is available at the software tab of the PDC website, HYPERLINK "https://pdc.usace.army.mil/"<https://pdc.usace.army.mil/>.

6.6.4 Foundation

The foundation is site specific and must be designed upon known geotechnical considerations by an engineer knowledgeable of the local conditions, e.g. expansive soils, groundwater levels. Final building pad elevations are to be determined by others and provided by the Government. Coordinate the need for a vapor barrier with the architectural floor finishes and requirements of the geotechnical report. All slab-on-grade to receive a coating (e.g. epoxy) or to receive an overlaying finish (e.g. carpet or tile), shall be underlain by a vapor barrier system with a minimum 10-mil polyethylene membrane. Structural foundation elements shall have appropriate concrete compressive strength for the design application.

6.6.5 Site Features – Retaining Walls/Bridges/etc.

Design site features, e.g. retaining walls, culverts, bridges, in accordance with the appropriate American Association of State Highway and Transportation Officials (AASHTO) criteria including AASHTO LRFD Bridge Design Specifications, AASHTO Standard Specifications for Highway Bridges, and AASHTO Guide Specifications for Design of Pedestrian Bridges. Consider operation and maintenance requirements, e.g. painting, mowing, inspecting, routine maintenance. Design site features to drain properly in order to meet loading assumptions.

6.6.6 Walls and Partitions

The exterior walls of the buildings are to resist lateral loads per code criteria and may be load bearing for roof support. Attachment to the foundation and the roof diaphragm shall be adequate to transfer lateral shear and gravity loads. Interior partitions shall have lateral rigidity for seismic loads but, are not to accept any vertical gravity loads.

6.6.7 Roof Framing System

The roof framing system shall adequately resist live loads, snow loads, wind loads and rain-on snow surcharge loads per code criteria. Roof decking or sheathing and its attachment shall provide adequate diaphragm shear resistance for the transfer of lateral load. Roof slope and roof covering shall conform to Base standards.

6.6.8 Design Analysis

Computer generated calculations must identify the program name, source, and version. Provide input data, including loads, loading diagrams, node diagrams, and adequate documentation to illustrate the design. The schematic models used for input must show, as a minimum, nodes/joints, element/members, materials/properties, and all loadings, induced settlements/deflections, etc., and a list of load combinations. Results must include an output listing for maximum/minimum stresses/forces and

deflections for each element and the reactions for each loading case and combination.

6.7. THERMAL PERFORMANCE

6.7.1 Thermal Insulation of Mechanical Systems

6.7.1.1 Mechanical Equipment Insulation

Heating water and chilled water piping shall be insulated. All ducts shall be insulated in the mechanical rooms and all supply and outside air ducts shall be insulated. Cold piping, ductwork, dual temperature (hot and cold) piping, and dual temperature (hot and cold) ductwork shall have a vapor barrier. Exterior piping shall be provided with an aluminum jacket and shall be sealed watertight. Minimum insulation thicknesses shall be in accordance with ASHRAE 90.1-2007. Exhaust and relief ductwork which have exterior discharge shall be insulated beginning ten (10) feet from the point of penetration of the building exterior wall.

6.7.1.2 Potable Water Piping Insulation

Domestic hot and cold water piping shall be insulated. Cold piping shall have a vapor barrier. Exterior piping shall be provided with an aluminum jacket and shall be sealed watertight. Exposed piping on handicapped accessible lavatories shall be provided with insulating cover. Insulate service hot water piping and storage to meet the minimum requirements of ASHRAE 90.1-2007.

6.7.1.3 Insulation Protection

In areas such as mechanical rooms, repair and maintenance areas, janitor's closets, et cetera, do not leave insulation exposed to view. Provide insulation with a protective, water resistant, corrosion resistant covering to a height of 7 feet above finished floor.

6.8. PLUMBING

6.8.1 General Plumbing Requirements

6.8.1.1 Equipment in mechanical rooms shall be mounted on four (4) inch thick reinforced concrete housekeeping pads that shall extend six (6) inches beyond the edges of the equipment.

6.8.1.2 Appliances and equipment shall be supported by substantial bases or hangers capable of supporting the loads to which they will be subjected as determined by the ICC IBC. Stationary equipment shall be fixed in position by substantial means which will prevent its incidental displacement. The restraint shall accommodate both of the vertical and lateral loads including, where applicable, wind, snow and seismic as required by the International Building Code. Piping, electrical conduit, ductwork, vents and the like shall not be used to provide support or restraint of equipment. Where provisions of the International Building Code require noncombustible construction or supports, noncombustible materials shall also be used to meet the requirements of this section.

6.8.1.3 Limit water velocity to 6 feet per second (fps) on domestic cold water and 4 fps domestic hot water.

6.8.1.4 Domestic hot water circulation pumps and piping shall be sized, tested and maintained water velocities below the maximum of 4 fps.

6.8.1.5 Balancing valves or auto flow control valves shall be provided on all domestic hot water recirculation piping.

6.8.1.6 Cross connections between water supply, piping and waste, drain, vent or sewer piping are prohibited.

6.8.1.7 All backflow preventers shall be installed in Mechanical rooms for accessibility and shall comply with any and all requirements of the local authority, state authority, International Building Code, and International Plumbing Code.

6.8.1.7.1 Lawn irrigation systems shall include a backflow preventer placed in the piping system immediately after the connection to the main potable water supply line. Locate the backflow preventer in the mechanical room.

6.8.1.8 Connect all fixtures requiring domestic hot water to a hot water recirculating system. The hot water recirculating system, when operating, shall continually circulate domestic hot water in order to insure that domestic hot water is available at each fixture in no greater than four (4) seconds. Provide a bronze fitted hot water recirculation pump for each water heater. Size hot water recirculation pump in accordance with the ASHRAE Handbook-HVAC Applications, Chapter 49, "Service Water Heating": Provide automatic control, from the building control system, for domestic hot water circulation pumps to permit operation only during periods of occupancy plus 30 minutes (adjustable) prior.

6.8.1.9 Floor drains: Floor drains shall be provided in all mechanical rooms, janitors closets, toilet areas, near all items requiring condensate removal, all outside entries with a recessed floor mat, and other areas as required by applicable codes.

6.8.1.10 Wall Hydrants: Exterior (key-operated) freeze-proof wall hydrants with vacuum-breaker backflow-preventer shall be located on outside walls at 100 feet intervals (minimum of one per building face). A wall hydrant shall be provided near all Mechanical Room exterior doors. Exterior wall hydrants shall be mounted twenty-four (24) inches above finished grade.

6.8.1.11 Water Meters. Domestic water supply to each building shall be provided with a water meter located inside the building. Meter shall be turbine type and shall meet the requirements of AWWA C701.

6.8.1.12 Urinals (if used) shall be waterless and shall meet the following criteria: ASME A112.19.2M, white vitreous china, wall mounted, wall outlet. Install with urinal rim 17 inches above the floor. Provide ASME A112.6.1M concealed chair carriers. Installation, maintenance and testing shall be in accordance with the manufacturers' recommendations. Slope the sanitary sewer branch line for non-water use urinals a minimum of ¼ inch per foot. Drain lines that connect to the urinal outlet shall not be made of copper tube or pipe.

6.8.1.13 A minimum of one (1) hose bibb shall be provided in each mechanical room.

6.8.1.14 Any natural gas fired device shall produce no greater than thirty (30) parts per million (ppm) nitrogen oxides (NOx) in flue gasses at 3% excess oxygen and combustion air temperature of 68 degrees F.

6.8.1.15 Excess Pressure Hazard: Include devices to reduce accidental excess pressure to acceptable level, with maximum overpressure of 10 percent over specified system operating pressure, for the following

items:

- a) Water heaters.
- b) Hot water storage tanks.
- c) Booster pumps.
- d) Hot water recirculation pumps.

6.8.1.16 Provide method of allowing thermal expansion of domestic water in the hot water system.

6.8.1.17 Do not use materials containing lead or asbestos.

6.8.1.18 Provide equipment suitable for use at the project altitude.

6.8.1.19 Drinking Fountains: use dual-level electric water coolers. Non-refrigerated drinking fountains are not permitted.

6.8.1.20 Install pipe markers (ANSI standard) on all piping, regardless of location. Provide uniquely numbered non-melting tags on all valves, steam traps, and other mechanical and electrical equipment.

6.8.1.21 Drain, Waste and Venting piping materials shall comply with the materials listed in the International Plumbing Code.

6.8.1.22 Domestic hot and cold water piping shall comply with the materials listed in the International Plumbing Code. The design velocity through the copper piping shall be a maximum of under all velocities listed in 6.8.1.3 operating conditions. All hot and cold water lines shall be insulated.

6.8.1.23 For the SFAC building only. All domestic water supply plumbing system components shall be NSF 61 certified. No component of the domestic water plumbing system shall contribute to action levels of lead in the domestic water as established by 40 CFR 50.12 Part 141.80(c)(1).

6.8.1.24 In addition to tests required by the IPC, perform testing for lead in the SFAC. Testing shall be as follows: After system disinfection and flushing, the domestic water system shall be allowed to sit for 24 hours and then shall be tested at all drinking fountains and faucets for lead in the potable water. Unless more stringent local requirements exist, lead shall not exceed 15 parts per billion (15ppb) per 40 CFR 50.12 Part 141.80(c)(1). Water supply to the building shall also be tested separately for lead contamination.

6.8.1.25 All water closets shall be floor mounted.

6.8.1.26 Provide water connection for all GFGI furnished fridges or ice makers.

6.8.2 GAS DISTRIBUTION

6.8.2.1 Gas Contractor (Omega) they will provide the underground natural gas service the new facilities to include the meter/regulator set (2 PSIG delivery) to be located right side the mechanical room that houses natural gas fired equipment. D/B contractor shall provide interior reducing regulators as required for gas

operating equipment IAW NFPA 54.

6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.9.1 Medium Voltage Service Distribution

6.9.1.1 The power distribution is privatized and maintained by LaClede Electric through a contract with Ft. Leonard Wood Directorate of Public Works. Contract administrator shall be contacted during design through the Contracting Officer.

A) LaClede Electric shall provide:

- 1) Primary service including the transformer and pad.
- 2) Secondary conduits from the secondary section to 1-2 feet from the transformer pad. The conduits will be sized to match the provided design.
- 3) Final connection of the service conductors to transformer.
- 4) Metering and enclosure rated to meet the EPAC Regulations.
- 5) Final cost, for the project, to the Directorate of Public Works once Contractor's design is solid.

B) Ft Leonard Wood Directorate of Public Works shall provide:

- 1) Approval for location of transformer and pad.
- 2) Gas and electric rates for determining HVAC design parameters, i.e. the most cost effective operating system. See appendices for information available at time of bid.
- 3) All payments to LaClede Electric.
- 4) Site design approval related to utilities.
- 5) Final cost statement, for the project, to COE once Contractor's design is solid.

C) Contracting Officer shall provide:

- 1) All coordination between the D/B Contractor and the Directorate of Public Works.
- 2) Payment to the Directorate of Public Works for Electrical Utility cost, for the project from the project funds.

D) Contractor shall provide:

- 1) An electrical load summary for the local electric utility. This summary shall indicate voltage, connected loads in KVA for largest motor, lighting, receptacles, cooling loads, heating loads, kitchen loads, specialized equipment loads, and general loads. This summary must be provided 1 year before delivery of the utility transformer to the site due to ordering lead times.

- 2) Size of secondary conduits and conductors with electrical load summary information.
- 3) Extension of the secondary conduits from the utility-provided conduits to each facilities' service panel.
- 4) A 1-1/4" conduit from metering enclosure to the DDC equipment location. Conduit shall be provided with pull string and meet I3A for pulling future fiber optic cable within.
- 5) Secondary cables to transformer with 15 feet extra cable for termination by LaClede.
- 6) Proposed location of transformer and site communications plan for approval by Directorate of Public Works.

6.9.2 Underground 600V Distribution System

6.9.2.1 Contractor shall furnish and install an underground 600V class distribution system to provide power to all new facilities constructed by the requirements of this SOW. The distribution system shall include but not be limited to 600V cable, manholes, pull boxes, duct bank, conduit, and all accessories commonly used in 600V underground distribution. All distribution shall be routed underground from the low voltage side of pad mounted transformers through a duct bank, or direct buried conduit raceway system as required.

6.9.3 Conduits and Fittings

6.9.3.1 All exterior power and communication service conduits shall be 4" or larger PVC. Conduits installed above grade shall be rigid galvanized steel (RGS). Fittings for steel conduit shall be steel threaded or compression type. Screw, clamp or other type fittings are not acceptable. The conduit that runs from the transform pad to the building, the service lateral to the building, needs to be placed in concrete. The conduit must be rigid galvanized steel when it comes through concrete.

6.9.3.2 Provide horizontally drilled (bored) cables with rigid galvanized steel (RGS) sleeve under roads. Roads may not be cut for utility installation without specific acceptance of the COE.

6.9.3.3 Provide all buried conduits and cables a minimum of 36" below finished grade or 24" below bottom of pavement. All buried cable shall be marked with warning tape equipped with metal tracer installed 18" immediately below grade and provided with signal stations. Underground connections or splices are prohibited, except in boxes or manholes. Splices shall be in a self-draining, rodent-resistant box with a cover. Provide cover with appropriate labeling. A tracer wire should be placed directly on the pipe and secured to the pipe every 5 feet, the tape will be placed directly above the pipe within 6" to 12" of final grade.

Refer to FACILITY ELECTRICAL SYSTEMS for additional requirements.

6.9.4 Grounding: Refer to FACILITY ELECTRICAL SYSTEMS for additional requirements.

6.9.5 Luminaries and Accessories

6.9.5.1 Provide exterior lighting in compliance with the recommendations of the Illumination Engineering Society of North America (IESNA). Exterior site and area lighting shall be metal halide HID type to meet Base standards. Exterior lighting shall include parking areas, hardstands, roadways, training areas,

exercise areas, facility, and walkways. Design of lighting shall include 0.72 LLF maximum and 0.5 footcandle minimum values. Calculations for parking lot lighting shall be to obtain an IESNA Figure 22-21 recommended footcandle levels and ratios. Furnish point by point photometric calculations for compliance review. Also, provide photometric calculations for NFPA 101 foot-candle requirements to the public way for compliance review.

6.9.5.2 Provide exterior luminaires complete with lamps and ballasts. Ballasts for High-Intensity-Discharge (HID) shall be constant wattage autotransformers (CWA) or regulator, high power-factor type. Provide single-lamp ballasts, which shall have a minimum starting temperature of minus 20 degrees F. HID ballasts shall have a solid-state igniter/starter with an average life in the pulsing mode of 10,000 hours at the intended ambient temperature. Igniter case temperature shall not exceed 90 deg. F. Fluorescent fixtures, if used outside, shall contain ballasts with a minimum starting temperature of minus 20 degrees F. In the photometric calculations, use a 0.36 LLF for any exterior fluorescent fixtures. Emergency ballasts shall be provided for exterior luminaires per requirements in IBC 1006.3 and NFPA 101 paragraph A.7.9.1.1.

6.9.6 Site Communication System General Requirements and Coordination

6.9.6.1 Provide telecommunications service into the building from the designated location near the site. Coordinate with the Site project's D/B Contractor to complete the installation of the exterior cables and connections. Multi-pair copper cable and multi-strand single mode (SM) fiber optic cable (FOC) shall be furnished for telephone and data communications, respectively. This D/B Contractor shall complete the installation the fiber optic cables within the building. All telecommunication services running into the buildings shall be encased in concrete.

6.9.6.2 Design for the final connections is the responsibility of this D/B Contractor. Coordination of communication system minimum standards shall be coordinated with the Fort Leonard Wood Directorate of Information Management (DOIM) through the Corps of Engineers Field representative.

6.9.6.3 See paragraph 6.10.3 for additional requirements.

6.9.7 Cable TV (CATV) Distribution

6.9.7.1 The local cable television (CATV) company shall provide and install service cabling throughout the project site and terminations in the main communications room of each facility. Coordinate the facility interfaces with the local CATV company.

6.9.7.2 Provide a 4 ft by 4 ft handhole a minimum of 10 feet from facility for vendor interface and cable entry into the building. Provide a 4-inch conduit from the handhole to a wall-mounted enclosure inside each facility. The local Cable TV Company shall install the service coaxial CATV cables from the handhole through the 4-inch conduit to the wall-mounted enclosure in each building's main communications room.

6.9.7.3 The Government shall make the selection of the CATV company which will provide this service to these facilities.

6.9.8 Telephone Vendor Distribution

6.9.8.1 The local telephone company shall provide and install service cabling throughout the project site and terminations in the main communications room of each facility. Coordinate the facility interfaces with the local telephone company.

6.9.8.2 Provide a 4 ft by 4 ft handhole a minimum of 10 feet from facility for vendor interface and cable entry into the building. Provide a 4-inch conduit from the handhole to a wall-mounted fire-resistant backboard inside the facility. The local telephone company shall install the service cables from the handhole through the 4-inch conduit to the wall-mounted backboard in each building's main communications room.

6.9.8.3 The Government shall make the selection of the telephone company which will provide this service to these facilities.

6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.10.1 Power

6.10.1.1 Provide service power factor at 95% or better.

6.10.1.2 Provide 20% spare circuit breakers in all switchboards and panelboards. Equipped space shall be provided in the power distribution equipment for future expansion. Electrical rooms shall have adequate capacity for the future expansion of the electrical distribution system.

6.10.1.3 Provide all 600V secondary service wiring as copper insulated conductors. Wire connectors of insulating material or solder less pressure connectors properly taped shall be utilized for all splices. Secondary service conductors shall be sized for the facility service and panel distribution and adjusted for voltage drop as required to limit the voltage drop to not more than 2%. Branch circuit conductors shall be sized for the load and adjusted for voltage drop as required to limit voltage drop to not more than 5% at the end of the circuit. Power conductor wiring identification shall be made by permanently attached

printed markers and by color. Hand lettering or marking is not acceptable. Marking shall include the phase (or neutral), panel number, and circuit number. The color of the insulation on phases A, B, and C respectively (for three phase power conductors) or Phases A and B respectively (for single-phase power conductors) as

follows: 208Y/120V, Phase A, Black; 208Y/120V, Phase B, Red; 208Y/120V, Phase C, Blue; 480Y/277V, Phase A, Brown; 480Y/277V, Phase B, Orange; 480Y/277V, Phase C, Yellow. Conductor identification by a particular color shall be maintained continuously for the length of the circuit including junction boxes and splices. Provide permanent laminated equipment tags for all electrical equipment, including but not limited to, switchboards, panelboards, motor controllers, disconnect switches, transformers, and circuit breakers.

6.10.1.4 Provide power to receptacles for communications and other systems within the communications rooms with dedicated neutrals for each circuit.

6.10.1.5 Power circuits feeding workstation are limited to three workstations per circuit. Electrified Systems furniture is connected with junction boxes. Provide with 12 inch minimum coiled conductors for connection by systems furniture installation contract electrical sub-contractor. Furniture comes with male and female modular connectors shipped with furniture.

6.10.1.5 Power circuits feeding workstation are limited to three workstations per circuit. Electrified Systems furniture is connected with junction boxes. Provide with 12 inch minimum coiled conductors for connection by systems furniture installation contract electrical sub-contractor. Furniture comes with male and female modular connectors shipped with furniture. Consult with project manger on who will be responsible for final electrical connections.

6.10.1.6 Provide a green insulated, safety ground wire for all feeders and branch circuits.

6.10.1.7 Unless directed otherwise the projectors used in conference rooms and similar spaces shall be plug and play type with data outlet in ceiling and on wall for direct connection to a computer. Power shall be provided from a receptacle. **In addition, Conference rooms and alike shall be provided with ceiling mounted junction box with 1" conduit to a wall mounted junction box for future wiring.**

6.10.1.8 Provide general purpose receptacles as NEMA 5-20 rated duplex receptacles, minimum.

6.10.1.9 Provide offices that do not use electrified systems furniture with power and telecommunications outlets to serve more than one furniture layout.

6.10.1.10 For housekeeping purposes, no point along wall bottom shall be more than 20 feet from a 125-volt duplex receptacle.

6.10.1.11 In addition to the receptacles required, provide a minimum of two 125-volt duplex receptacles in each telecommunications room. In addition, provide a minimum of one 125-volt duplex receptacle in each janitor's closet and storage room. GFCI devices shall be provided where required by NFPA 70.

6.10.1.12 Provide 125-volt GFCI weather proof receptacles 25' apart on each exterior wall of each building, and on the roof within 25' of each piece of mechanical equipment

6.10.2 General Lighting and Controls

6.10.2.1 The exterior and possibly any interior automated lighting controls shall utilize the DDC system

instead of a separate time clock device. This is to allow remote access and easy coordinated schedule adjustments based on occupancy changes.

6.10.2.2 Occupancy sensors in areas shall be set for functioning after the switch is in the ON position. Interior ambient illumination shall provide a generally glare free, high quality lighting environment and conform to IESNA RP-1-04.

6.10.2.3 Interior use of HID lighting shall not be considered. Use fluorescent T5 straight 4' lamp technology for all similar applications.

6.10.2.4 Provide energy efficient T-8 lamps and electronic ballasts where fluorescent fixtures are installed at 9'-0" AFF or lower. Provide energy efficient T-5 lamps and electronic ballasts where fluorescent fixtures are installed higher.

6.10.2.5 Provide for safe night visibility at all drives, parking lots, porches, and walks according to IESNA with minimums to meet 0.5 FC and all requirements.

6.10.2.6 Provide red LED exit signs with directional arrows at all exit doors, corridors, and hallways.

6.10.2.7 In addition for the required emergency lighting locations, emergency lighting shall be provided in rooms that are used to egress from another room, as a minimum, to illuminate the travel path. Emergency lighting shall be provided in rooms where staff is not familiar with on a daily occurrence, such as conference, mechanical, electrical, communications, large storage rooms, and at each entrance to the building.

6.10.2.8 Install all class 2 and class 3 control circuits in metallic conduit.

6.10.2.9 Please provide dimmer switches in all conference and counseling rooms in both the SFAC and CoHQ.

6.10.3 Facility Telecommunications

6.10.3.1 Telecommunications design must be performed and stamped by a Registered Communications Distribution Designer (RCDD) with 2 yrs related experience or person with 5 yrs related experience. The information systems designer must prepare the test plan, and witness and certify the testing of telecommunications cabling. In the I3A Technical Guide, substitute the word "shall" for the word "should" throughout the document. The I3A Technical Guide shall be considered to be MANDATORY Criteria.

6.10.3.2 Multi-pair 24 gauge copper conductor telephone cable shall be furnished for voice communications and multi-strand single mode fiber optic cable shall be furnished for data communications. Coordination of communication system minimum standards shall be coordinated with the Information Management (DOIM) through The Corps of Engineers Contract representative.

(1) Provide a total of 50 pairs of 24 AWG conductors to each building. The facility's voice only communications cables shall terminate at a backboard, 110 type block after the protected entrance terminal. Another 110 type block adjacent to the incoming block shall be used for terminating facility wiring.

(2) Provide a 12 strand SM fiber optic cable for each facility. The facility service data fiber optic cables shall terminate on a patch panel, on 19-inch floor-mounted standard rack. Rack shall be mounted in a front and back open enclosure that is 24 inches wide by 36 inches long. Mount enclosure with 30 inch side working access and 36 inch front and back working access. Terminate cables with ST connectors at facility service entrance. The facility's data communication shall terminated at an RJ45 patch panel in this rack. Provide the patch cables (fiber and copper) and connect as required by DOIM to meet I3A requirements.

6.10.3.3 For the DDC system, provide dedicated telephone lines to copper OSP. Provide clearly labeled for Ft Leonard Wood DOIM to terminate in the telecommunications room.

6.10.3.4 As required, telecommunications rooms shall be designed and plans shall include a clear room layout including all equipment, conduit stub-up locations, cable tray, and related working spaces. Room layout shall require approval from Fort Leonard Wood NEC prior to construction.

6.10.3.5 The SIPRnet room(s) shall be a separate dedicated room meeting all referenced requirements.

6.10.3.6 Fort Leonard Wood DOIM uses "B" configuration for wiring of CAT 6 cabling.

6.10.4 Cable TV (CATV) Distribution

6.10.4.1 Provide a 24x24x12 wall-mounted enclosure in the main communications room inside the facility. Provide the enclosure with backboard and a dedicated NEMA 5-20 receptacle. All interior building CATV cables shall be installed in metallic raceways, and shall terminate in this enclosure. Provide interior distribution in accordance with I3A and indicated requirements for this facility.

6.10.5 Other Special Systems

6.10.5.1 Provide rough-in, including power, for intrusion, cameras, and other GFGI systems in this contract. The Provost Marshal Office and other stakeholders shall be included in design to identify the rough-in requirements including power loads.

6.10.5.2 Intercom, Public Address, etc. systems required by this contract shall be interfaced as much as possible to avoid duplication of speakers and components required. All audio/visual systems are required to be silenced during fire alarm and mass notification announcements.

6.10.5.3 Rough-in conduit and boxes for duress alarms in the counseling rooms and the reception desk of the SFAC.

6.10.5.4 Provide a mass notification system for this facility as described in 6.13.3.

6.11. HEATING, VENTILATING, AND AIR CONDITIONING

6.11.1 General Requirements

The following items shall apply to all heating and cooling systems in the building:

(a) Refrigeration equipment provided shall have an ozone depletion factor of 0.0. Exposed coils on chiller shall be provided with manufacturer's optional hail guard. Chillers shall be provided with a manufacturer's standard debris guards enclosing the base of the chiller. For systems utilizing outdoor chillers or cooling coils exposed to outside air, the chilled water (if used) shall be a mixture of inhibited propylene glycol and deionized water. The Chilled water solution concentration shall be based on sound engineering practice and engineering weather data. Unit shall be provided with manufacturer's standard packaged controls. Chillers shall have low ambient control and hot gas bypass.

(b) Heating fluid solution (if used) shall be a mixture of propylene glycol and deionized water. The Heating fluid solution concentration shall be based on sound engineering practice and engineering weather data.

(c) Heating and cooling systems with glycol shall include an automatic glycol makeup system.

(d) Any natural gas fired device shall produce no greater than thirty (30) parts per million (ppm) nitrogen oxides (NO_x) in flue gasses (at 3% excess oxygen and combustion air temperature of 68 degrees F).

(e) Make-up air units, if used, shall be of the hydronic type.

6.11.2 Communications Rooms

Communications rooms shall be provided with stand alone, split system, direct expansion cooling systems which shall operate independent of the building heating and cooling system. Heat shall be rejected to the mechanical room or to the building exterior. Design the communications room cooling equipment to maintain a temperature of 72 degrees F. Louver hail guards for remote (outside) condensers and low ambient controls.

6.11.3 General Piping Requirements

- (a) All pipe and equipment supports and hangers shall be coordinated with the roof design to avoid overloading of any of the structural elements.
- (b) Air handling unit water coils shall be provided with flexible connector on the supply and return piping unless the unit fan(s) are provided with internal vibration isolation.
- (c) Piping and supports shall not interfere with equipment maintenance access.
- (d) All condensate drains shall be indirectly connected to sanitary sewer system.
- (e) Exterior piping run at grade shall include protective covers.
- (f) Exterior piping below grade shall include provision for draining.
- (g) Plumbing and service water systems shall be flushed and chemically cleaned prior to final fill.
- (h) For heating and chilled water systems (if used), the initial chemical treatment shall be provided by the contractor. Chemical treatment shall include rust inhibitors of type and mixture recommended by equipment manufacturers.
- (i) Heating water (if used) and chilled water (if used) piping systems shall each be provided with a chemical feed tank, including isolation valves, drain valve and drain piping. Each tank shall be connected to its respective piping system to allow for the automatic and manual addition of chemical to the heating and/or cooling system.
- (j) Excess Pressure Hazard: Include devices to reduce accidental excess pressure to an acceptable level, with maximum overpressure of 10 percent over specified system operating pressure, for the following items:
 - (1) Circulating pumps
 - (2) Boilers
- (k) Provide method of allowing thermal expansion in any hydronic system (if used).

6.11.4 General Ductwork Requirements

The following items shall apply to all ductwork in the building:

- (a) All ductwork and equipment supports and hangers shall be coordinated with the roof design to avoid overloading of any of the structural elements.
- (b) Air handling unit ductwork connections shall be provided with flexible connector on the supply and return ducts unless the unit fan(s) are provided with internal vibration isolation.
- (c) Ductwork and supports shall not interfere with equipment maintenance access.

6.11.4.1 Air Velocity

- (a) Air velocity within ductwork shall be kept low enough such that air movement within the ductwork shall not generate untoward noise in the areas below the ductwork.
- (b) Provide an air distribution system that limits the air velocity to 50 fpm, at 4 feet above the finished floor, maximum.
- (c) Adjustments: Provide an air distribution system which allows adjusting direction of airflow from supply diffusers, adjusting dampers and changing the temperature sensor setpoint.
- (d) Provide air handling units that are designed such that the face velocity on the cooling coil does not exceed 500 feet per minute (FPM) or manufacturers written velocity where moisture carryover does not occur.
- (e) Provide intake louvers that are designed such that at maximum airflow, the velocity does not exceed 750 FPM through free area.
 - (1) At maximum air flow the intake louver shall be below the moisture entrainment threshold.
- (f) The maximum allowable velocity for exhaust louvers is 1000 FPM through free area.

6.11.5 HVAC Controls

Provide the elements necessary to control the building's indoor environment. Provide a building control system which controls the indoor environment, manages energy consumption, schedules preventative maintenance, monitors fuel consumption, monitors water usage, and monitors packaged equipment controls. The existing system on Ft. Leonard Wood is a LonWorks web based system by Distech, TAC Vista or Cercon. The installation and integration of the building control system shall be by a Contractor authorized by Distech, TAC Vista or Cercon. The Contractor shall submit documentation to verify that he is an authorized dealer and installer of the control system. The point of contact for HVAC controls is Directorate of Public Works Operation Division, Mechanical Section EMCS/UMCS LonWorks DDC Personnel.

6.11.5.1 Monitoring & Control

Provide monitoring and control of the following equipment:

6.11.5.2 Air Terminal Units (if used)

- (a) Fan start/stop control (where applicable)
- (b) Damper position status (where applicable)
- (c) Space air temperature
- (d) Heating Coil Valve (where applicable)
- (e) Cooling Coil Valve (where applicable)

6.11.5.3 Air Handling Units (if used)

- (a) Supply fan start/stop control

- (b) Return fan start/stop control
- (c) Exhaust fan start/stop control
- (d) Supply fan proof of operation
- (e) Return fan proof of operation
- (f) Exhaust fan proof of operation (where required by system configuration)
- (g) Outside airflow
- (h) Air flow measuring stations
- (i) AHU mixed air temperature
- (j) AHU discharge air temperature
- (k) AHU supply duct static pressure (where required by system configuration)
- (l) AHU return air temperature
- (m) Outside air temperature
- (n) Building static pressure
- (o) Space temperature(s)
- (p) AHU Coils:
 - (1) Heating water control valve
 - (2) Chilled water control valve
- (q) AHU supply fan variable frequency drive:
 - (1) Enable/disable
 - (2) Speed reference
 - (3) Status alarm
- (r) AHU return fan variable frequency drive:
 - (1) Enable/disable
 - (2) Speed reference
 - (3) Speed failure

- (s) AHU outside air, return air and relief air damper position control
- (t) Heating water pump start/stop
- (u) Heating water pump status verification
- (v) AHU filter status
- (w) Low temperature shutoff status

6.11.5.4 Chillers (if used)

- (a) Chiller alarm status
- (b) Start/stop status
- (c) Entering chilled water temperature
- (d) Leaving chilled water temperature
- (e) Chilled water pump start/stop
- (f) Chilled water pump status verification
- (g) Safety controls
- (h) Chilled water supply temperature reset

6.11.5.5 Boilers (if used)

- (a) Start/stop status
- (b) Percent of full load
- (c) Boiler return water temperature
- (d) Boiler supply water temperature
- (e) Boiler circulating pump start/stop (if required by system configuration)
- (f) Boiler circulating pump status verification
- (g) Boiler enable/disable
- (h) Temperature set point reset
- (i) Boiler alarm
- (j) Low water pressure alarm

6.11.5.6 Pumps

- (a) Start/stop
- (b) Start.stop status
- (c) Hand-off auto (HOA) switches in all starters/VFD's

6.11.5.10 Zoning and Space Temperature Control

- (a) Dedicated terminal unit and space temperature sensor for each separated space. Temperature sensor shall be adjustable at room user level. Mounting installation height shall be 54".
- (b) Dedicated terminal unit and space temperature sensor for each corner space. Temperature sensor shall be adjustable at room user level. Mounting installation height shall be 54"

6.11.5.11 Required Functions and Features

Provide the following control functions and features:

- (a) Holiday scheduling
- (b) Night setback
- (c) Outside air economizer
- (d) Boiler staging
- (e) Chilled water temperature reset
- (f) Heating water temperature reset
- (g) Locate the central controller in the mechanical room
- (h) Field panels which are independent and do not need the central controller to continue functioning
- (i) Be locally powered; link power (over the control network) is not acceptable
- (j) Be fully configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (NCI), or hardware settings on the controller itself to support the application.
- (k) To the greatest extent practical, not rely on the control network to perform its control loop application functions.
- (l) Gateways may be used provided that each gateway communicates with and performs protocol translation for control hardware controlling one and only one package unit.

6.11.5.12 Control System Requirements

- (a) Direct digital control (DDC) system: A single complete system suitable for, but not limited to, DDC of the heating, ventilating, and air conditioning (HVAC) systems, and other building-level systems.
- (b) The DDC system provided shall be capable of operating fully in a stand-alone mode should communication with the Post Utilities Control System (UCS) be lost.
- (c) Provide sequence of operation for the functions of all systems and equipment.
- (d) Integrate building control systems into the existing Post UCS
- (e) All HVAC functions and input/output points in the building DDC systems shall be capable of being monitored and/or controlled by the post UCS at the operator workstation.
- (f) Provide full support of the post operations contractor, providing all necessary information to complete the reprogramming of the UCS server and testing of the DDC integration into the UCS, prior to the contract final completion date.
- (g) Information provided by the installing contractor to the post operations contractor shall include, but not be limited to, equipment data sheets, written control sequences, IF files, and input/output points list, occupancy schedules, alarm settings.
- (h) Use an industry-standard open protocol and supporting architecture for the HVAC controller that will not result in the use of proprietary (Government sole source procurement) systems or components for the expansion of building-level systems or for communication with a post-wide building UCS system
- (i) The control system shall be designed for post wide UCS multi-vendor interoperability in accordance with Paragraph 5 requirements and EIA-852.
- (j) Utility Monitoring and Control System (UMCS): Contractor shall integrate to existing UMCS. Integration into existing system is defined as all points in the building(s) point schedule are viewable and editable from the operator's workstation. Time schedules, trending, alarms, and reports can be created and modified from within the operator workstation using the UMCS software options as described above. The building(s) are integrated into the software using Fort Leonard Wood UMCS personnel when integrating into existing systems or facilities. The use of gateways is not part of an acceptable alternative. An approved equal system shall have an intelligent hierarchy system for viewing buildings, small and large equipment, energy source monitoring (gas, electric and water meters), etc. An approved equal system shall be able to create/modify time schedules, historical and real-time trending, and reports, and create/modify alarms.

6.11.6 Point Schedule

The contractor shall provide an input/output schedule for all points which will contain the following information as a minimum:

- (a) Device address and Node ID.
- (b) Input and Output SNVTs including SNVT Name, Type and Description
- (c) Hardware I/O, including Type (AI, AO, BI, BO) and Description.

(d) HVAC Control Points List. Provide Points Schedule drawing that shows every DDC Hardware device. See appendix L Typical Control System Point Schedules for typical controls system points schedules. The points schedule drawings convey a great deal of information critical to the design, installation, and subsequent performance of the controls system. It includes hardware input/output information, device ranges and settings, ANSI 709.1 communications protocol data, and information about data that is to be used at the operator workstation by the Monitoring and Control software. These schedules are available as an excel spread sheet and as AutoCad drawings on the Engineering Knowledge Online (EKO) website HYPERLINK "<https://eko.usace.army.mil/fa/bas>" <https://eko.usace.army.mil/fa/bas> under the September 2007 Review Files tab. Point schedule of system types onto address in Appendix L Typical Control System Point Schedules shall be developed by the D/B Contractor, and shall be sufficiently detailed to a level consistent to a similar listed system in Appendix L Typical Control System Point Schedules. It is recommended that all of the guidance and instruction documents be reviewed prior to using any of the info, as the documents provide necessary and critical information to the use of the website drawings and other information. Not all control points schedules in Appendix L are applicable to this project. Control points schedules shall be selected and completed based on design features of project.

6.11.7 Not Used

6.11.8 Evaporative Cooling

The use of evaporative cooling (cooling towers, etc.) is not permitted.

Integrate the control system to the installation's existing UMCS. The existing UMCS is LonWorks

6.12. ENERGY CONSERVATION

6.12.1. General

6.12.1 Note that ASHRAE 90.1 requires the use of ASHRAE 62.1 for ventilation and exhaust rates. Coordinate system selection with the installation based on energy usage and life cycle cost, reliability and operating considerations, and the limited maintenance capabilities and resources of user. Life cycle cost analysis shall be performed by the successful offeror after award and submitted to the contracting officer.

6.12.2 Coordinate with the customer on their plans to implement the Energy Policy Act of 2005 (Public Law 109-58) for estimating purposes, assume no additional requirements for adding alternative fueling stations.

6.12.2. Inclusion of Renewable Energy Features. The following renewable energy features have been determined lifecycle cost effective, are included in the project budget and shall be provided:

Not used.

6.13. FIRE PROTECTION

6.13.1 Design fire protection system, including fire suppression and fire alarm systems, per UFC 3-600-01, except as follows. Design mass notification per UFC 4-021-01. All design shall involve the Fort Leonard Wood Fire Department and require approval prior to construction. Provide compliance with the Fort Leonard Wood DESIGN SPECIFICATION FOR CONSTRUCTION OF FIRE DETECTION AND FIRE SUPPRESSION document attached in the appendices.

6.13.2 Provide a Knox box that is keyed to the Ft. Leonard Wood fire and emergency services account, at the nearest exit that permits access to the electrical room. Generally, on building with brick exterior finish, a recess mounted Knox Box shall be required. Knox Box #3275 Dark Bronze with tamper switches and #3290 recessed mounting kit. For building that need surface mounting, Knox Box #3266 Dark Bronze with tamper switches. FLW Fire & Emergency Services will furnish to contractor an approved application to order Knox Box.

6.13.3 Fire department vehicle access roads shall be designed for a 105-foot ladder truck, weighing 62000 LBS, with a 100-foot turning radius.

6.13.4 If gates or chains are used on access points, then a residential knox box shall be provided by the Contractor at each location keyed to the Fire Department Account. This knox box does not require connection to the building fire alarm system.

6.13.5 Provide Fire Extinguishers and fire extinguisher cabinets. Provide 10 lb. ABC in the office areas and 20 lb. ABC for shop/repair area. Shop/repair area should have a fire extinguisher sign above location that is visible marking the location.

6.13.6 Provide a temporary building sign at each entrance to each building under construction EMS & Fire response. The sign shall be Brown background with white letters. The sign shall be visible from the road. The building number data can be obtained from DPW.

6.13.7 Contractor shall provide fire flow test and results for each hydrant installed for this project. Contractor shall paint the bonnet brim to match the results of the fire flow test in compliance with NFPA 291.

6.13.8 Fire Alarm

6.13.8.1 Provide an addressable intelligent fire alarm (FA) and mass notification (MN) system. Common speakers will be used for FA alarm and MN messages. Clear strobes are required in a red housing for FA, and amber strobes in a white housing for MN. Speaker and strobes combined in one unit is acceptable.

6.13.8.2 Provide all Fire Alarm notification annunciations with:

A. Steady tone for 5 seconds, (Male voice) Message to say: "May I have your attention please! A fire emergency has been reported in the building. While this is being verified, please leave the building by the nearest exit."

B. Standard Fire Alarm tone for 5 minutes.

C. Repeat.

6.13.8.3 Provide the FACP in the electrical room if one is in the building. Placement of the FACP in the communication room or mechanical room is not permitted when an electrical room is used. Buildings that do not have electrical rooms shall utilize the Mechanical Room in compliance with the Fort Leonard Wood DESIGN SPECIFICATION FOR CONSTRUCTION OF FIRE DETECTION AND FIRE SUPPRESSION document.

6.13.8.4 The FACP shall be keyed, with key code the same as the Monaco transceiver to prevent local user access to the fire alarm control panel (FACP).

6.13.8.5 Provide a graphic annunciator which is a wall mounted architectural plan of the building with LED lamps, located at the fire department entry.

6.13.8.6 All valves, including the PIV, shall have tamper switches.

6.13.8.7 Provide Fire Alarm notification with DRILL function for local user operation. Provide with interface to the Local User MN remote annunciator.

6.13.9 Mass Notification (MN)

6.13.9.1 Provide a, Wheelock ATI, UHF signal transceiver with FSK protocol to the Ft Leonard Wood master Wheelock Mass Notification system in building 3200. This unit may be located adjacent to the Fire Alarm transceiver. MN messages shall NOT be sent to the county 911 center. Separate MN and FA transceivers and antennas are required. This transceiver shall be fully interfaced with the Fire Alarm equipment to provide all the functions necessary for interface all local features. The automatic over-ride and return between buildings Fire Alarm System and MNS by the EOC shall not require action by the local user to reset the system. The EOC shall be able to transmit any message their equipment permits into the buildings through the system.

6.13.9.2 The Local Operator Console shall be provided adjacent to the graphic annunciator at the fire fighter entry point.

6.13.9.3 Local Operator Console (LOC) for the project shall be a Cooper Wheelock Safepath 4, or approved equal with the following features.

A. Located near the Fire Alarm annunciator.

B. Keyed access as directed by Ft Leonard Wood fire department.

C. Remote Microphone with push button interrupting the FA signal until finger pressure is released.

D. Eight individual mass notification pre-recorded messages selector push buttons and one separately located ON - OFF switch.

(1) Button 1. FIRE ALARM DRILL, See Fire Alarm description above.

(2) Button 2. BUILDING EMERGENCY, Steady tone for 5 seconds, (Male Voice) Message to say: "May I have your attention please! An emergency has been reported in the building. Emergency personnel are in route. While this is being verified, please leave the building by the nearest exit."

(3) Button 3. SHELTER-IN-PLACE, Alternating Steady tone for 5 seconds, (Male voice) Message to say: "Attention. Seek Shelter immediately. Close doors and windows. Shut off heating, ventilation and air-conditioning. Seek shelter immediately."

(4) Button 4. TEST, Steady tone for 5 seconds, (Female voice) Message to say: "This is a test of the Fort Leonard Wood Mass Notification System, repeat this is only a test."

(5) Buttons 5 thru 8 to be left blank for future use by EOC.

(6) ON - OFF switch - HVAC Emergency Cut-off switch wired for simulated Fire Alarm activation. Once turned ON again the HVAC system should go through standard ON start-up sequencing required by the DDC system. DDC Notification of the ON-OFF status is required. Switch may be a pushbutton style.

6.14. SUSTAINABLE DESIGN

6.14.1. LEED Rating Tool Version. This project shall be executed using LEED-NC Version 3.

6.14.2. The minimum requirement for this project is to achieve LEED Silver level. Each non-exempt facility (building plus sitework) must achieve this level. In addition to any facilities indicated as exempt in paragraph 3, the following facilities are exempt from the minimum LEED achievement requirement: None..

6.14.3. Credit Validation: The project is a standard design building(s) portion of a multiple contractor Combined Project. LEED registration, compiling of documentation at LEED OnLine and use of the LEED Letter Templates is required. Registration and payment of registration fees will be by the Government. Administration/team management of the online project will be by the Contractor. See Appendix LEED Requirements for Multiple Contractor Combined Projects for information about registered standard designs. Validation of credits will be accomplished by the Government. LEED certification of the project by the Contractor is not required. The Government may choose to seek LEED certification of the project, in which case the Government will pay certification fees and coordinate with GBCI and the Contractor will furnish audit data as requested at no additional cost.

6.14.4. Commissioning: See Appendix M for Owner's Project Requirements document(s).

6.14.5. LEED Credits Coordination. The following information is provided relative to Sustainable Sites and other credits.

MR Credit 2 Construction Waste Management.

The Installation does not have an on-post recycling facility available for Contractor's use.

Regional Priority Credits (Version 3 only)

The project zip code is 65473.

See LEED Multiple Contractor Responsibilities Table(s) for additional information.

6.14.6. LEED Credit Preferences, Guidance and Resources. See Appendix L LEED Project Credit Guidance for supplemental information relating to individual credits.

6.14.7. Multiple Contractor Combined Project. When site work and building(s) are accomplished by separate contractors, it is a Multiple Contractor Combined Project for purposes of LEED scoring and documentation. This project is part of a Multiple Contractor Combined Project that includes site work and building(s) accomplished by separate contractors. See Appendix LEED Requirements for Multiple Contractor Combined Projects and Appendix LEED Multiple Contractor Responsibilities Table(s) for special requirements for this project.

6.14.8. Additional Information

6.14.7.1 USGBC registration and payment of registration fees has been completed by the government in advance under LEED rating system v2.2 NC. The D/B contractor shall still be responsible for the use of LEED letter templates.

6.14.7.2 D/B Contractor shall assign a LEED-AP responsible to track LEED planning, performance, and documentation for each LEED credit through construction closeout. Incorporate LEED credits in the plans, specifications, and design analyses. Develop LEED supporting documentation as a separable portion of the Design Analysis and provide with each required design submittal. Include the LEED project checklist for each non-exempt facility with each submittal. (One checklist may be provided for multiple facilities in accordance with the LEED-NC Applications Guide for Multiple Buildings and On-Campus Building Projects and the LEED NC v2.2 Documentation requirements and Submittal Checklist) Final design submittal for each portion of the work must include all required design documentation relating to

that portion of work. (Example – all site credit design documents with final site design) Submittal requirements are as indicated in LEED related Appendices. Submit all documentation required at final design submittal (for fast-track projects with multiple final design submittals, this shall be at the last scheduled final design submittal). All project documentation related to LEED shall conform to USGBC requirements for both content and format, including audit requirements and be separate from other design analyses. Maintain and update the LEED documentation throughout project progress to construction closeout and shall compile product data, receipts, calculations, and other data necessary to substantiate and support all credits claimed. The government may audit any or all individual credits. Audit documentation is not required to be submitted unless requested. These requirements apply to all projects. If the project requires the D/B Contractor to obtain USGBC certification, the D/B Contractor shall also be responsible for obtaining USGBC certification and shall provide written evidence of certification with the construction closeout LEED documentation submittal. Install the USGBC building plaque at the location indicated by the Government upon receipt. If the Contractor obtains USGBC interim design review, submit the USGBC review to the Government within 30 days of receipt for information only.

6.14.7.3 LEED Review Meetings:

Red Zone Meeting: At approximately 80% of the contract completion or 60 days before the anticipated Beneficial Occupancy Date (BOD), whichever occurs first, the D/B Contractor and the Government's project delivery team will conduct what is known as the Red Zone Meeting to discuss the closeout process, to schedule the events, and review responsibilities for actions necessary to produce a timely physical, as well as fiscal, project close-out. The ACO will chair the meeting. If not already provided, the D/B Contractor shall provide an electronic copy or access to CADD as-built drawings, completed to commensurate with the amount of work completed at the time of the Red Zone Meeting, as an indicator of the Contractors understanding of and ability to meet the USACE CADD Standards and to ensure that the D/B Contractor is making progress with CADD as-built requirements.

Pre-Closeout Meeting: Approximately 30 days before submittal of LEED closeout documentation the D/B Contractor and the Government's project delivery team (including installation representative) will meet to review the documentation, determine which credits will be audited (if any), and identify any corrections/missing items.

Closeout Meeting: Approximately 14 days after submittal of LEED closeout documentation, the D/B Contractor and Government's project delivery team (including installation representative) will meet to review the LEED closeout documentation. The review conference will include discussion of and resolution of all review comments to ensure consensus on achievement of credits and satisfactory documentation. At the review conference a final score will be determined and endorsed in writing by all parties.

6.14.7.4 LEED Documentation Coordination

Refer to Appendix N LEED Requirements for Multiple Contractor Combined Projects for guidance in coordinating LEED credits. The D/B Contractor for the Barracks and Site shall take a leadership role in the LEED documentation for the WT Complex. The D/B Contractor for the Admin Facilities (Admin HQ and SFAC) shall be required to submit all required information to the D/B Contractor for the Barracks and Site for LEED Documentation and LEED review meetings.

6.15. ENVIRONMENTAL

6.15.1. Refer to Sections 00 73 00 SPECIAL CONTRACT REQUIREMENTS and 01 57 20.00 10 ENVIRONMENTAL PROTECTION.

6.15.2. An Environmental Assessment has been prepared by the Government for this site and is included as part of this RFP in the appendices.

6.15.3. All facilities shall have backflow preventers on water service lines, sanitary sewer service lines and any other sources of possible cross contamination.

6.15.4. At the initial partnering meeting, discussion on the removal of trees shall be conducted. The Design-Build Contractor shall ensure the Directorate of Public Works fully understands the trees to remain, the trees to be removed during construction and the procedures to be used for removal and disposal of trees. Please note that burning is not allowed on the Post. Immediately prior to the start of construction, one final site visit shall be held with the Directorate of Public Works. This site visit shall include all necessary staff as determined by the Directorate of Public Works. All trees to be removed shall be so marked on site. All trees to be saved shall be protected by temporary construction fencing or other methods as approved by the Directorate of Public Works to establish the limits of construction and limits of construction traffic in the vicinity of the protected tree.

6.15.5. In addition to the requirements of Section 01 57 20.00 10, all petroleum or petroleum products, oil, lubricants, hazardous materials, and hazardous waste stored in 55-gallon containers or larger and located on site must have a secondary containment structure capable of holding at least 110% of the total combined capacity of the all the containers stored in a specific location. This includes animal-based and vegetable-based grease commonly associated with dining facilities.

6.15.6. In addition to the requirements of Section 01 57 20.00 10, wash-out from cement and concrete trucks shall be controlled and contained on site and not allowed to run over the surface of the ground, enter the storm sewer system or discharge to the waters of the State. A truck wash out area shall be clearly established and control methods in place prior to start of work.

6.15.7. In addition to the requirements of Section 01 57 20.00 10, the Contractor shall submit the SWPPP to Fort Leonard Wood Environmental Office for approval with their land disturbance application.

6.15.8. In addition to the requirements of Section 01 57 20.00 10, paragraph 1.2.3.10, "The Spill Control Plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, 40 CFR 112, and/or regulated under State or Local laws and regulations."

6.15.9. In addition to the requirements of Section 01 57 20.00 10, paragraph 1.2.3.10.a, "The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Contracting Officer, the post's Fire Department and the Fort Leonard Wood Environmental Office if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers."

6.16. PERMITS

6.16.1 The Government has obtained no permits/licenses related to this project. It shall be the responsibility of the D/B Contractor to obtain ALL permits/licenses required for this project. Permitted work shall be in accordance with the associated permit. Copies of the permits shall be submitted to the

Contracting Officer and Fort Leonard Wood Environmental Division and must be in sufficient time to allow for review and revision with ultimate submittal at least 10 days before NTP for the associated permitted activity. Copies of permit amendments shall also be provided to the Contracting Officer and Fort Leonard Wood Environmental Division. D/B Contractor shall be responsible for determining fee basis and paying all filing fees.

6.16.2 Digging Permit shall be provided to Fort Leonard Wood Environmental Division.

6.16.3 Fort Leonard Wood operates under a Title I Air Permit for air quality requirements. The D/B Contractor shall be responsible for providing the necessary information to obtain the air permit. Air permit information (listing of boilers, generators and domestic hot water heaters, quantity and quality of the type of fuel(s), firing rate) shall be provided to Fort Leonard Wood Environmental Division.

6.16.4 Water and sewer extensions require the stamp of an engineer licensed in the state of Missouri.

6.16.5 All other permits as applicable

6.17. DEMOLITION

6.17.1 Utility removal shall be limited to only those beneath the facility and those in close proximity to foundations. It is the D/B Contractor's responsibility for verification of all site utilities.

6.17.2 Removal of the trees as required for construction of the new facility and parking lot.

6.17.3 The Contracting Officer shall be notified of any unforeseen utilities encountered as soon as discovered during construction.

6.17.4 All temporary traffic control and signage shall be per the Manual on Uniform Traffic Control Devices (MUTCD) and approved by the Contracting Officer.

6.17.5 Any damage to existing pavements and utilities that are to remain shall be repaired at no additional cost to the government.

6.18. ADDITIONAL FACILITIES

6.18.1 No additional requirements.

End of Section 01 10 00

**SECTION 01 32 01.00 10
PROJECT SCHEDULE**

1.0 GENERAL

1.1. REFERENCES

1.2. QUALIFICATION

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.2. BASIS FOR PAYMENT AND COST LOADING

3.3. PROJECT SCHEDULE DETAILED REQUIREMENTS

3.4. PROJECT SCHEDULE SUBMISSIONS

3.5. SUBMISSION REQUIREMENTS

3.6. PERIODIC SCHEDULE UPDATE MEETINGS

3.7. REQUESTS FOR TIME EXTENSIONS

3.8. DIRECTED CHANGES

3.9. WEEKLY PROGRESS MEETINGS

3.10. OWNERSHIP OF FLOAT

3.11. TRANSFER OF SCHEDULE DATA INTO RMS/QCS

1.0 GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- U.S. ARMY CORPS OF ENGINEERS (USACE) ER 1-1-11 (1995) Progress, Schedules, and Network Analysis Systems <http://www.usace.army.mil/publications/eng-regs/er1-1-11/entire.pdf>
- Army Corps of Engineers ECB No. 2005-10, (31 August 2005) Scheduling Requirements for Testing of Mechanical Systems in Construction http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2005_10.pdf

1.2. QUALIFICATIONS

The Contractor shall designate an authorized representative who shall be responsible for the preparation of the schedule and all required updating (statusing) and preparation of reports. The authorized representative shall be experienced in scheduling projects similar in nature to this project and shall be experienced in the use of the scheduling software that meets the requirements of this specification.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.1.1. Submit a project schedule as specified herein for approval showing the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing all schedule activities. The scheduling of the entire project, including the design and construction sequences is required. Contractor management personnel shall actively participate in its development. Designers, subcontractors and suppliers working on the project shall also contribute in developing an accurate project schedule. The schedule must be a forward planning as well as a project monitoring tool. The approved project schedule shall be used to measure the progress of the work and to aid in evaluating requests for excusable time extensions. The schedule shall be cost loaded and activity coded as specified herein. The schedule will provide the basis for all progress payments. If the Contractor fails to submit any schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule

3.1.2. Status the schedule on at least a monthly basis, as specified herein. If in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained. See paragraph 3.7.4.

3.1.3. Failure of the Contractor to comply with the requirements of the Contracting Officer shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of the contract.

3.2. BASIS FOR PAYMENT AND COST LOADING

The schedule shall be the basis for determining contract earnings during each update period and therefore the amount of each progress payment. Lack of an approved schedule update or qualified scheduling personnel will result in an inability of the Contracting Officer to evaluate contract earned value for the purposes of payment. Failure of the Contractor to provide all information, as specified herein will result in the disapproval of the preliminary, initial and subsequent schedule updates. In the event schedule revisions are directed by the Contracting Officer and those revisions have not been included in subsequent revisions or updates, the Contracting Officer may hold retainage up to the maximum allowed by contract, each payment period, until such revisions to the

project schedule have been made. Activity cost loading shall be reasonable as determined by the Contracting Officer. The aggregate value of all activities coded to a contract CLIN as specified herein shall equal the value of the CLIN on the Schedule.

3.3. PROJECT SCHEDULE DETAILED REQUIREMENTS

The computer software system utilized to produce and update the project schedule shall be capable of meeting all requirements of this specification. Failure of the Contractor to meet the requirements of this specification will result in the disapproval of the schedule. Scheduling software that meets the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER-1-1-11(1995) referenced herein are Primavera Project Planner (P3) by Primavera, and Open Plan by Deltek.

3.3.1. Use of the Critical Path Method

Use the Critical Path Method (CPM) of network calculation to generate the project schedule. Prepare the project schedule using the Precedence Diagram Method (PDM).

3.3.2. Level of Detail Required

Develop the project schedule to an appropriate level of detail. Failure to develop the project schedule to an appropriate level of detail, as determined by the Contracting Officer, will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2.1. Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities shall have Original Durations (OD) greater than 20 work days or 30 calendar days. Procurement activities are defined herein.

3.3.2.2. Design and Permit Activities

Design and permit activities, including necessary conferences and follow-up actions and design package submission activities shall be included. The Contractor shall include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. This shall be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. The schedule shall include review and correction periods associated with each item.

3.3.2.3. Procurement Activities

The schedule must include activities associated with the submittal, approval, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days. A typical procurement sequence includes the string of activities: submit, approve, procure, fabricate, and deliver.

3.3.2.4. Mandatory Tasks

The following tasks must be included and properly scheduled:

- 3.3.2.4.1. Submission, review and acceptance of design packages
- 3.3.2.4.2. Submission of mechanical/electrical/information systems layout drawings
- 3.3.2.4.3. Submission and approval of O & M manuals
- 3.3.2.4.4. Submission and approval of as-built drawings
- 3.3.2.4.5. Submission and approval of 1354 data and installed equipment lists

- 3.3.2.4.6. Submission and approval of testing and air balance (TAB)
- 3.3.2.4.7. Submission of TAB specialist design review report
- 3.3.2.4.8. Submission and approval of fire protection specialist
- 3.3.2.4.9. Submission and approval of testing and balancing of HVAC plus commissioning plans and data. Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail consistent with Engineering and Construction Bulletin (ECB) No. 2005-10 dated 31 August 2005.
- 3.3.2.4.10. Air and water balancing
- 3.3.2.4.11. HVAC commissioning
- 3.3.2.4.12. Controls testing plan submission
- 3.3.2.4.13. Controls testing
- 3.3.2.4.14. Performance Verification testing
- 3.3.2.4.15. Other systems testing, if required
- 3.3.2.4.16. Contractor's pre-final inspection
- 3.3.2.4.17. Correction of punch list from Contractor's pre-final inspection
- 3.3.2.4.18. Government's pre-final inspection
- 3.3.2.4.19. Correction of punch list from Government's pre-final inspection
- 3.3.2.4.20. Final Inspection

3.3.2.5. Activity Responsibility Coding (RESP)

Assign Responsibility Code for all activities to the Prime Contractor, Subcontractor or Government agency responsible for performing the activity. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements. Code all activities not coded with a Government Responsibility Code to the Prime Contractor or Subcontractor responsible to perform the work. Activities shall not have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE). Unacceptable code values are abbreviations of the names of subcontractors.

3.3.2.6. Activity Work Area Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities shall not have more than one Work Area Code. Not all activities are required to be Work Area coded. A lack of Work Area coding will indicate the activity is not resource or space constrained.

3.3.2.7. Contract Changes/Requests for Equitable Adjustment (REA) Coding (MODF)

Assign Activity code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer, with a Contract Changes/REA Code. Key all Code values to the Government's modification numbering system.

Any activity or sequence of activities added to the schedule as a result of alleged constructive changes made by the Government may be added to a copy of the current schedule, subject to the approval of the Contracting Officer. Assign Activity codes for these activities with a Contract Changes/REA Code. Key the code values to the Contractor's numbering system. Approval to add these activities does not necessarily mean the Government accepts responsibility and therefore liability for such activities and any associated impacts to the schedule, but rather the Government recognizes such activities are appropriately added to the schedule for the purposes of maintaining a realistic and meaningful schedule. Such activities shall not be Responsibility Coded to the Government unless approved. An activity shall not have more than one Contract Changes/REA Code

3.3.2.8. Contract Line Item (CLIN) Coding (BIDI)

Code all activities to the CLIN on the Contract Line Item Schedule to which the activity belongs. An activity shall not contain more than one CLIN Item Code. CLIN Item code all activities, even when an activity is not cost loaded.

3.3.2.9. Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities, based upon the phase of work in which the activity occurs. Code activities to either a Design Phase or a Construction Phase. Code fast track design and construction phases proposed by the Contractor to allow filtering and organizing the schedule by fast track design and construction packages. If the contract specifies construction phasing with separately defined performance periods, identify a Construction Phase Code to allow filtering and organizing the schedule accordingly. Each activity shall have only one Phase of Work code.

3.3.2.10. Category of Work Coding (CATW)

Assign Category of Work code to all Activities based upon the category of work which the activity belongs. Category of Work Code must include, but is not limited to: Design, Design Submittal, Construction Submittal, Approval, Acceptance, Procurement, Fabrication, Delivery, Weather Sensitive Installation, Non-Weather Sensitive Installation, Start Up, Test, and Turnover. Assign a Category of Work code to each activity. Each activity shall have only one Category of Work Code.

3.3.2.11. Definable Features of Work Coding (FOW1, FOW2, FOW3)

Assign a Definable Feature of Work Code to appropriate activities based on the definable feature of work to which the activity belongs. Definable Feature of Work is defined in Specification Section 01 45 04.00 10, Contractor Quality Control. An activity shall not have more than one Definable Feature of Work Code. Not all activities are required to be Definable Feature of Work Coded.

3.3.3. Scheduled Project Completion and Activity Calendars

The schedule interval shall extend from NTP date to the required contract completion date. The contract completion activity (End Project) shall finish based on the required contract duration in the accepted contract proposal, as adjusted for any approved contract time extensions. The first scheduled work period shall be the day after NTP is acknowledged by the Contractor. Schedule activities on a calendar to which the activity logically belongs. Activities may be assigned to a 7 day calendar when the contract assigns calendar day durations for the activity such as a Government Acceptance activity. If the Contractor intends to perform physical work less than seven days per week, schedule the associated activities on a calendar with non-work periods identified including weekends and holidays. Assign the Category of Work Code - Weather Sensitive Installation to those activities that are weather sensitive. Original durations must account for anticipated normal adverse weather. The Government will interpret all work periods not identified as non-work periods on each calendar as meaning the Contractor intends to perform work during those periods.

3.3.3.1. Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. Include as the first activity in the project schedule an activity called "Start Project" or "NTP". The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, with a zero day duration.

3.3.3.2. Schedule Constraints and Open Ended Logic

Constrain completion of the last activity in the schedule by the contract completion date. Schedule calculations shall result in negative float when the calculated early finish date of the last activity is later than the contract completion date. Include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the contract completion date for the project, and with a zero day duration or by using the "project must finish by" date in the scheduling software. The schedule shall have no constrained dates other than those specified in the contract. The use of artificial float constraints such as "zero free float" or "zero total float" are typically prohibited. There shall only be 2 open ended activities: Start Project (or NTP) with no predecessor logic and End Project with no successor logic.

3.3.3.3. Early Project Completion

In the event the Preliminary or Initial project schedule calculates an early completion date of the last activity prior to the contract completion date, the Contractor shall identify those activities that it intends to accelerate and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. The last activity shall have a late finish constraint equal to the contract completion date and the schedule will calculate positive float. The Government will not approve an early completion schedule with zero float on the longest path. The Government is under no obligation to accelerate activities for which it is responsible to support a proposed early contract completion.

3.3.4. Interim Completion Dates

Constrain contractually specified interim completion dates to show negative float when the calculated early finish date of the last activity in that phase is later than the specified interim completion date.

3.3.4.1. Start Phase

Include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

3.3.4.2. End Phase

Include as the last activity for a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the specified completion date for that phase and a zero day duration.

3.3.4.3. Phase "X" Hammock

Include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" hammock activity shall be logically tied to the earliest and latest activities in the phase.

3.3.5. Default Progress Data Disallowed

Do not automatically update Actual Start and Finish dates with default mechanisms that may be included in the scheduling software. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the AS and AF dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's updated schedule and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Disable program features which calculate one of these parameters from the other.

3.3.6. Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Correct out of sequence progress that continues for more than two update cycles by logic revision, as approved by the Contracting Officer.

3.3.7. Negative Lags and Start to Finish Relationships

Lag durations contained in the project schedule shall not have a negative value. Do not use Start to Finish relationships (SF).

3.3.8. Calculation Mode

Schedule calculations shall retain the logic between predecessors and successors even when the successor activity starts and the predecessor activity has not finished. Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") will not be allowed.

3.3.9. Milestones

The schedule must include milestone activities for each significant project event including but not limited to: milestone activities for each fast track design package released for construction; design complete; foundation/substructure construction complete; superstructure construction complete; building dry-in or enclosure complete to allow the initiation of finish activities; permanent power complete; and building systems commissioning complete.

3.4. PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

3.4.1. Preliminary Project Schedule Submission

Submit the Preliminary Project Schedule, defining the Contractor's planned operations for the first 90 calendar days for approval within 15 calendar days after the NTP is acknowledged. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. Detail it for the first 90 calendar days. It may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as previously specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required Plan and Program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, the planned submissions of all early design packages, permitting activities, design review conference activities and other non-construction activities intended to occur within the first 90 calendar days. Schedule any construction activities planned for the first 90 calendar days after NTP. Constrain planned construction activities by Government acceptance of the associated design package(s) and all other specified Program and Plan approvals. Activity code any activities that are summary in nature after the first 90 calendar days with Responsibility Code (RESP) and Feature of Work code (FOW1, FOW2, FOW3)

3.4.2. Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after NTP. The schedule shall demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. The Initial Schedule shall be at a reasonable level of detail as determined by the Contracting Officer. The schedule shall include detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any required Government actions; and long lead procurement activities required prior to design completion. The Initial Project Schedule shall include the entire construction sequence and all fast track construction activities, with as much detail as is known at the time but, as a minimum, shall include all construction start and completion milestone activities, and detailed construction activities through the dry-in milestone, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by Government acceptance of associated designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone.

3.4.3. Design Package Schedule Submission:

With each design package submitted to the Government, submit a frag-net schedule extracted from the then current Preliminary, Initial or Updated schedule which covers the activities associated with that Design Package including construction, procurement and permitting activities.

3.4.4. Periodic Schedule Updates

Based on the result of the meeting specified in PERIODIC SCHEDULE UPDATE MEETINGS, submit periodic schedule updates. These submissions shall enable the Contracting Officer to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made. Update the schedule to include detailed procurement and construction activities as the design progresses, but not later than the submission of the final, un-reviewed design submission for each separate design package. The Contracting Officer may require submission of detailed schedule activities for any distinct construction that is started prior to submission of a final design submission, if such activity is authorized.

3.4.5. Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used. A template SDEF compatible schedule backup file (sdef.prx) is available on the QCS website: www.rmssupport.com. The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per Day
2	RESP	4	Responsible Party (e.g. GC, subcontractor, USACE)
3	AREA	4	Area of Work
4	MODF	6	Modification or REA number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of Work
7	CATW	1	Category of Work
8	FOW1	10	Feature of Work (used up to 10 characters in length)
9	FOW2	10	Feature of Work (used up to 20 characters in length)
10	FOW3	10	Feature of Work (used up to 30 characters in length)

3.5. SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1. Data CD's

Provide two sets of data CD's containing the project schedule in the backup format. Each CD shall also contain all previous update backup files. File medium shall be CD. Label each CD, indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file names. Each schedule shall have a unique file name as determined by the Contractor.

3.5.2. Narrative Report

Provide a Narrative Report with the Preliminary, Initial, and each Periodic Update of the project schedule, as the basis of the progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths where the total float is less than or equal to 20 work days, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to communicate to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through its analysis. Identify and explain why any activities that, based their calculated late dates, should have either started or finished during the update period but did not.

3.5.3. Approved Changes Verification

Include only those project schedule changes in the schedule submission that have been previously approved by the Contracting Officer. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.4. Schedule Reports

The format, filtering, organizing and sorting for each schedule report shall be as directed by the Contracting Officer. Typically reports shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. The following lists typical reports that will be requested. One or all of these reports may be requested for each schedule submission.

3.5.4.1. Activity Report

A list of all activities sorted according to activity number.

3.5.4.2. Logic Report

A list of detailed predecessor and successor activities for every activity in ascending order sorted by activity number.

3.5.4.3. Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

3.5.4.4. Earnings Report by CLIN

A compilation of the Contractor's Total Earnings on the project from the NTP to the data date. This report shall reflect the earnings of specific activities based on the agreements made in the schedule update meeting defined herein. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining progress payments. Group activities by CLIN Item number and sort by activity number. This report shall: sum all activities coded to a particular CLIN and provide a CLIN Item percent earned value; and complete and sum CLIN items to provide a total project percent complete. The printed report shall contain, for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

3.5.5. Network Diagram

The network diagram is required for the Preliminary, Initial and Periodic Updates. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished.

The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.5.1. Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.5.5.2. Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.5.3. Critical Path

Clearly show the critical path.

3.5.5.4. Banding

Organize activities as directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.5.5.5. S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

3.6. PERIODIC SCHEDULE UPDATE MEETINGS

Conduct periodic schedule update meetings for the purposes of reviewing the Contractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy and determining earned value. Meetings shall occur at least monthly within five days of the proposed schedule data date and after the Contractor has updated the schedule with Government concurrence respecting actual start dates, actual finish dates, remaining durations and percent complete for each activity it intend to status. Match the actual start and finish dates with the dates exported, as described in paragraph 3.3.5. Provide a computer with the scheduling software loaded and a projector during the meeting which allows all meeting participants to view the proposed schedule update during the meeting. The meeting and resultant approvable schedule update shall be a condition precedent to a formal submission of the update as described in SUBMISSION REQUIREMENTS and to the submission of an invoice for payment. The meeting will be a working interactive exchange which will allow the Government and the Contractor the opportunity review the updated schedule on a real time and interactive basis. The Contractor's authorized scheduling representative will organize, sort, filter and schedule the update as requested by the Government. The meeting will last no longer than 8 hours. A rough draft of the proposed activity logic corrections and narrative report shall be provided to the Government 48 hours in advance of the meeting. The Contractor's Project Manager and Authorized Scheduler shall attend the meeting with the Authorized Representative of the Contracting Officer.

3.6.1. Update Submission Following Progress Meeting

Submit a complete update of the project schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 working days after the periodic schedule update meeting, reflecting only those changes made during the previous update meeting.

3.6.2. Activity Statusing

Statusing information, including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD) and Percent Complete shall be subject to the approval of the Government prior to the meeting. As a minimum, address the following items on an activity by activity basis during each progress meeting:

3.6.2.1. Actual Start and Finish Dates

Accurately status the AS and/or AF dates for each activity currently in-progress or completed since the last update. The Government may allow an AF date to be assigned with the percent complete less than 100% to account for the value of work remaining but not restraining successor activities. Only assign AS dates when actual progress occurs on an activity.

3.6.2.2. Remaining Duration

Update the estimated RD for all incomplete activities independent of Percent Complete. Remaining durations may exceed the activity OD or may exceed the activity's prior update RD if the Government considers the current OD or RD to be understated based on current progress, insufficient work crews actually manning the job, unrealistic OD or deficiencies that must be corrected that restrain successor activities.

3.6.2.3. Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be statused 100 percent complete. To allow for proper schedule management, cost load the correction of punch list from Government pre-final inspection activity(ies) not less than 1% of the total contract value, which activity(ies) may be statused 100 percent complete upon completion and correction of all punch list work identified during Government pre-final inspection(s).

3.6.2.4. Logic Changes

Specifically identify and discuss all logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, and other changes that have been made pursuant to contract provisions. The Government will only approve logic revisions for the purpose of keeping the schedule valid in terms of its usefulness in calculating a realistic completion date, correcting erroneous logic ties, and accurately sequencing the work.

3.6.2.5. Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule that does not represent the actual or planned prosecution and progress of the work.

3.7. REQUESTS FOR TIME EXTENSIONS

In the event the Contractor believes it is entitled to an extension of the contract performance period, completion date, or any interim milestone date, furnish the following for a determination by the Contracting Officer: justification, project schedule data, and supporting evidence as the Contracting Officer may deem necessary. Submission of proof of excusable delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is a condition precedent to any approvals by the Government. In response to each Request For Proposal issued by the Government, the Contractor shall submit a schedule impact analysis demonstrating whether or not the change contemplated by the Government impacts the critical path.

3.7.1. Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with its request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay, will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.7.2. Submission Requirements

Submit a justification for each request for a change in the contract completion date of less than 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

3.7.2.1. A list of affected activities, with their associated project schedule activity number.

3.7.2.2. A brief explanation of the causes of the change

3.7.2.3. An analysis of the overall impact of the changes proposed.

3.7.2.4. A sub-network of the affected area

Identify activities impacted in each justification for change by a unique activity code contained in the required data file.

3.7.3. Additional Submission Requirements

The Contracting Officer may request an interim update with revised activities for any requested time extension of over 2 weeks. Provide this disk within 4 days of the Contracting Officer's request.

3.7.4. If Progress Falls Behind the Approved Project Schedule

3.7.4.1. Should progress fall behind the approved schedule (more than 20 work days of negative float) due to Contractor generated problems, promptly provide a supplemental recovery or completion schedule that illustrates its efforts to regain time to assure a completion by the required contract completion date.

3.7.4.2. The supplemental recovery or completion schedule will not replace the original, approved schedule as the official contract schedule. Continue to update the original, approved schedule on at least a monthly basis. In addition, the Contractor and the Contracting Officer will monitor the supplemental recovery or completion schedule on at least a bi-weekly basis to determine its effect on regaining the rate of progress to assure project completion by the contractually required completion date.

3.7.4.3. Do not artificially improve progress by simply revising the schedule logic, modifying or adding constraints, or shortening future work activity durations. Resource and manpower load the supplemental recovery schedule or completion schedule with crew size and productivity for each remaining activity, indicating overtime, weekend work, and/or double shifts needed to regain the schedule, in accordance with FAR 52.236.15, without additional cost to the Government. Indicate assumptions made and the basis for any logic, constraint, or duration changes used in the creation of the supplemental recovery or completion schedule in a narrative submitted for the Contracting Officer's approval. Any additional resources or manpower must be evident at the work site. Do not modify the official contract schedule to include these assumptions.

3.7.4.4. Failure to perform work and maintain progress in accordance with the supplemental recovery or completion schedule may result in an interim and final unsatisfactory performance rating and/or may result in corrective action by the Contracting Officer in accordance with FAR 52.236-15.

3.8. DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The Contracting Officer will approve proposed revisions to the schedule prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor with suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the

Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.9. WEEKLY PROGRESS MEETINGS

3.9.1. The Government and the Contractor shall meet weekly (or as otherwise mutually agreed to) between the meetings described in paragraph PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. The then current and approved schedule update shall be used for the purposes of this meeting and for the production and review of reports. The Contractor's Project Manager and the Authorized Representative of the Contracting Officer shall attend. The weekly progress meeting will address the status of RFI's, RFP's and Submittals.

3.9.2. Provide a bar chart produced by the scheduling software, organized by Total Float and Sorted by Early Start Date, and a two week "look-ahead" schedule by filtering all schedule activities to show only current ongoing activities and activities schedule to start during the upcoming two weeks, organized by Work Area Code (AREA) and sorted by Early Start Date.

3.9.3. The Government and the Contractor shall jointly review the reports. If it appears that activities on the longest path(s) which are currently driving the calculated completion date (driving activities), are not progressing satisfactorily and therefore could jeopardize timely project completion, corrective action must be taken immediately. Corrective action includes but is not limited to: increasing the number of work crews; increasing the number of work shifts; increasing the number of hours worked per shift; and determining if Government responsibility coded activities require Government corrective action.

3.10. OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

3.11. TRANSFER OF SCHEDULE DATA INTO RMS/QCS

The Contractor shall download and upload the schedule data into the Resident Management System (RMS) prior to RMS databases being transferred to the Government and is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 - Payments under Fixed-Price Construction Contracts. The receipt of a proper payment request pursuant to FAR 52.232-27 - Prompt Payment for Construction Contracts is contingent upon the Government receiving both acceptable and approvable hard copies and electronic export from QCS of the application for progress payment.

End of Section 01 32 01.00 10

**SECTION 01 33 00
SUBMITTAL PROCEDURES**

1.0 GENERAL

- 1.1. DEFINITIONS
- 1.2. NOT USED
- 1.3. SUBMITTAL CLASSIFICATION
- 1.4. APPROVED OR CONCURRED WITH SUBMITTALS
- 1.5. DISAPPROVED SUBMITTALS
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1.0 GENERAL

1.1. DEFINITIONS

1.1.1. Submittal

Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

1.1.2. Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by SD numbers and titles as follows.

SD-01 Preconstruction Submittals

- Certificates of insurance.
- Surety bonds.
- List of proposed subcontractors.
- List of proposed products.
- Construction Progress Schedule.
- Submittal register.
- Schedule of prices.
- Accident Prevention Plan.
- Work plan.
- Quality control plan.
- Environmental protection plan.

SD-02 Shop Drawings

- Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.
- Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.
- Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

- Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.
- Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

- Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.
- Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.
- Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies that are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

- Calculations, mix designs, analyses or other data pertaining to a part of work.
- Design submittals, design substantiation submittals and extensions of design submittals.

SD-06 Test Reports

- Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must

have been within three years of date of contract award for the project.)

- Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.
- Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.
- Investigation reports.
- Daily checklists.
- Final acceptance test and operational test procedure.

SD-07 Certificates

- Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.
- Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.
- Confined space entry permits.
- Text of posted operating instructions.

SD-08 Manufacturer's Instructions

- Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

- Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- Factory test reports.

SD-10 Operation and Maintenance Data

- Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

SD-11 Closeout Submittals

- Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

1.1.3. Approving Authority

Office authorized to approve submittal.

1.1.4. Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2. NOT USED

1.3. SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1. Designer of Record Approved (DA)

1.3.1.1. Designer of Record (DOR) approval is required for all extensions of design, critical materials, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". Provide the Government the number of copies designated hereinafter of all DOR approved submittals, after the DOR has taken appropriate action. The DOR shall ensure that submittals conform to the Solicitation, the Accepted Proposal and the completed design, however see below for those submittals proposing a deviation to the contract or a substitution of a material, system, or piece of equipment that was identified by manufacturer, brand name or model description in the accepted contract proposal.

1.3.1.2. The DOR shall ensure that the submittals comply with all applicable Buy American Act and Trade Agreement Act clauses in the contract. The DOR may confer with the Contracting Officer's Representative for advice and interpretation of those clauses, as necessary.

1.3.1.3. The Government may, but is not required to, review any or all DOR approved submittals for conformance to the solicitation, accepted proposal and the completed design. Except for submittals designated as deviating from the Solicitation, the Accepted Proposal or completed design, the Contractor may proceed with acquisition and installation upon DOR approval. Government Approved (GA)

1.3.2. Government Approved (GA)

Government approval is required for any item specifically designated as requiring Government approval in the Solicitation, for internal and external color finish selections and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.3.3. Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the solicitation. Section 01 33 16 **DESIGN AFTER AWARD** covers the design submittal and review process in detail. Review will be only for conformance with the applicable codes, standards and contract requirements. Design data includes the design documents described in Section 01 33 16 **DESIGN AFTER AWARD**. Generally, design submittals should be identified as SD-05 Design Data submittals.

1.3.4. Designer of Record Approved/Government Conformance Review (DA/CR)

1.3.4.1. Deviations to the Accepted Design. Designer of Record approval and the Government's concurrence are required for any proposed deviation from the accepted design which still complies with the contract (the Solicitation and Accepted Proposal) before the Contractor is authorized to proceed with material acquisition or installation. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings." If necessary to facilitate the project schedule, the Contractor and the DOR may discuss a submittal proposing a deviation with the Contracting Officer's Representative prior to officially submitting it to the Government. However, the Government reserves the right to review the submittal before providing an opinion, if it deems it necessary. In any case, the Government will not formally agree to or provide a preliminary opinion on any deviation without the DOR's approval or recommended approval. The Government reserves the right to non-concur with any deviation from the design, which may impact furniture, furnishings, equipment selections or operations decisions that were made, based on the reviewed and concurred design.

1.3.4.2. Substitutions. Unless prohibited or provided for otherwise elsewhere in the Contract, where the accepted contract proposal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, and the Contractor desires to substitute manufacturer or model after award, submit a requested substitution for Government concurrence. Include substantiation, identifying information and the DOR's approval, as meeting the contract requirements and that it is equal in function, performance, quality and salient features to that in the accepted contract proposal.

1.3.5. Designer of Record Approved/Government Approved (DA/GA)

Any proposed deviation to the solicitation and/or the accepted proposal constitutes a change to the contract. In addition to the above stated requirements for proposed deviations to the accepted design, both Designer of Record and Government Approval and, where applicable, a contract modification are required before the Contractor is

authorized to proceed with material acquisition or installation for any proposed deviation to the contract. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". The Government reserves the right to accept or reject any such proposed deviation at its discretion.

1.3.6. Information Only

All submittals not requiring Designer of Record or Government approval will be for information only. Provide the Government "For Information Only" copies of all submittals not requiring Government approval or concurrence, after the Designer of Record has taken the appropriate action.

1.4. APPROVED OR CONCURRED WITH SUBMITTALS

Do not construe the Contracting Officer's approval of or concurrence with submittals as a complete check, but only that design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval or concurrence will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work. The Government won't consider re-submittals for the purpose of substituting previously approved materials or equipment unless accompanied by an explanation of why a substitution is necessary.

1.5. DISAPPROVED SUBMITTALS

Make all corrections required by the Contracting Officer, obtain the Designer of Record's approval when applicable, and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Resubmit any "information only" submittal found to contain errors or unapproved deviations from the Solicitation or Accepted Proposal as one requiring "approval" action, requiring both Designer of Record and Government approval. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, provide prompt notice in accordance with the Contract Clause "Changes" to the Contracting Officer.

1.6. WITHHOLDING OF PAYMENT

No payment for materials incorporated in the work will be made if all required Designer of Record or required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.7. GENERAL

Make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, the Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, shall check, approve, sign, and stamp all items, indicating action taken. Clearly identify proposed deviations from the contract requirements. Include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Schedule and make submittals requiring Government approval prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples remaining upon completion of the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.8. SUBMITTAL REGISTER (GA)

Develop a complete list of submittals, including each separate design package submittal. Submit the initial submittal register within 15 days after Notice to Proceed, including, as a minimum, the design packages and other initial submittals required elsewhere in the contract. The Designer of Record shall identify required submittals in the

specifications, and use the list to prepare the Submittal Register, utilizing the government-provided software, QCS (see Section 01 45 01.10), to create the ENG Form 4288. Appendix R is a preliminary submittal register input form for use with the Quality Management System and the Resident Office Management System (QCS and RMS). The Government will provide the Contractor the actual Excel Spreadsheet version of this sample input form after award to modify and to use for input into QCS. The Excel Spreadsheet is not totally inputable into QCS, so additional keystroke input will be necessary. The sample input form is not all-inclusive. In addition, additional submittals may be required by other parts of the contract. After award, the parties will meet to discuss contract specific (or task order specific for a task order contract) distribution for the submittals all-inclusive and additional submittals may be required by other parts of the contract. Develop and complete the submittal register as the design is completed. Submit it to the Contracting Officer with the un-reviewed final design package submission or as soon as the design specifications are completed, if before the final design submission. When applicable, if the Contractor elects to fast track design and construction, using multiple design package submissions, update the submittal register to reflect the submittals associated with each design submission, clearly denoting all revisions to the previous submission. The submittal register serves as a scheduling document for submittals and for control of submittal actions throughout the contract period. Coordinate the submit dates and need dates used in the submittal register with dates in the Contractor prepared progress schedule. Submit monthly updates to the submittal register showing the Contractor action codes and actual dates with Government action codes and actual dates or until all submittals have been satisfactorily completed. Revise and submit the submittal register when revising the progress schedule.

1.9. SCHEDULING

Schedule submittals covering component items forming a system or items that are interrelated to be coordinated and submitted concurrently. Schedule certifications to be submitted with the pertinent drawings. Allow adequate time (a minimum of 15 calendar days exclusive of mailing time) and show on the register for those items requiring Government approval or concurrence. No delay damages or time extensions will be allowed for time lost in late submittals by the Contractor.

1.10. TRANSMITTAL FORM (ENG FORM 4025)

Use the transmittal form (ENG Form 4025) for submitting submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor or are included in the QCS software if the Contractor is required to use QCS for this contract. Use a separate transmittal form for each specification section. Complete this form by filling out all the heading blank spaces and identify each item submitted. Exercise special care to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

1.11. SUBMITTAL PROCEDURES

Make submittals as follows:

1.11.1. Procedures

The Government will further discuss detailed submittal procedures with the Contractor at the Post-Award Conference.

1.11.2. Deviations

For submittals which include proposed deviations requested by the Contractor, check the column "variation" of ENG Form 4025. Set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.12. CONTROL OF SUBMITTALS

Carefully control his procurement operations to ensure that each individual submittal is made on or before the scheduled submittal date shown on the approved "Submittal Register."

1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

Upon completion of review of submittals requiring Government approval or concurrence, the Government will stamp and date the submittals as approved or concurred.. The Government will retain three (3) copies of the submittal and return zero(0) copy(ies) of the submittal.

1.14. INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. The Government will retain zero(0) copies of information only submittals.

1.15. STAMPS

Use stamps similar to the following on the submittal data to certify that the submittal meets contract requirements:

CONTRACTOR

(FIRM NAME)

Approved

Approved with corrections as noted on submittal data and/or attached sheet(s)

Signature:

Title:

Date:

For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record shall stamp and sign to certify that the submittal meets contract requirements.

**SECTION 01 33 16
DESIGN AFTER AWARD**

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ATTACHMENT B FURNITURE, FIXTURES AND EQUIPMENT REQUIREMENTS

ATTACHMENT C TRACKING COMMENTS IN DRCHECKS

ATTACHMENT D SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

ATTACHMENT E LEED SUBMITTALS

ATTACHMENT F BUILDING INFORMATION MODELING REQUIREMENTS

ATTACHMENT G DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT

1.0 GENERAL INFORMATION

1.1. INTRODUCTION

1.1.1. The information contained in this section applies to the design required after award. After award, the Contractor will develop the accepted proposal into the completed design, as described herein.

1.1.2. The Contractor may elect to fast track the design and construction that is, proceed with construction of parts of the sitework and facilities prior to completion of the overall design. To facilitate fast tracking, the Contractor may elect to divide the design into no more than ten (10) design packages per major facility type and no more than three (3) design packages for site and associated work. Designate how it will package the design, consistent with its overall plan for permitting (where applicable) and construction of the project. See Sections 01 33 00 SUBMITTAL PROCEDURES and 01 32 01.00 10 PROJECT SCHEDULE for requirements for identifying and scheduling the design packaging plan in the submittal register and project schedule. See also Sections 01 10 00 STATEMENT OF WORK and 01 57 20.00 10 ENVIRONMENTAL PROTECTION for any specified permit requirements. If early procurement of long-lead item construction materials or installed equipment, prior to completion of the associated design package, is necessary to facilitate the project schedule, also identify those long-lead items and how it will assure design integrity of the associated design package to meet the contract requirements (The Contract consists of the Solicitation requirements and the accepted proposal). Once the Government is satisfied that the long-lead items meet the contract requirements, the Contracting Officer will allow the Contractor to procure the items at its own risk.

1.1.3. The Contractor may proceed with the construction work included in a separate design package after the Government has reviewed the final (100%) design submission for that package, review comments have been addressed and resolved to the Government's satisfaction and the Contracting Officer (or the Administrative Contracting Officer) has agreed that the design package may be released for construction.

1.1.4. **INTEGRATED DESIGN.** To the maximum extent permitted for this project, use a collaborative, integrated design process for all stages of project delivery with comprehensive performance goals for siting, energy, water, materials and indoor environmental quality and ensures incorporation of these goals. Consider all stages of the building lifecycle, including deconstruction.

1.2. DESIGNER OF RECORD

Identify, for approval, the Designer of Record ("DOR") that will be responsible for each area of design. One DOR may be responsible for more than one area. Listed, Professional Registered, DOR(s) shall account for all areas of design disciplines shall be accounted for by a listed. The DOR's shall stamp, sign, and date each design drawing and other design deliverables under their responsible discipline at each design submittal stage (see contract clause Registration of Designers). If the deliverables are not ready for release for construction, identify them as "preliminary" or "not for release for construction" or by using some other appropriate designation. The DOR(s) shall also be responsible for maintaining the integrity of the design and for compliance with the contract requirements through construction and documentation of the as-built condition by coordination, review and approval of extensions of design, material, equipment and other construction submittals, review and approval or disapproval of requested deviations to the accepted design or to the contract, coordination with the Government of the above activities, and by performing other typical professional designer responsibilities.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

Submit for Government acceptance, a Design Quality Control Plan in accordance with Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL before design may proceed.

3.1.2. Post Award Conference

3.1.2.1. The government will conduct a post award contract administration conference at the project site, as soon as possible after contract award. This will be coordinated with issuance of the contract notice to proceed (NTP). The Contractor and major sub-contractor representatives shall participate. All designers need not attend this first meeting. Government representatives will include COE project delivery team members, facility users, facility command representatives, and installation representatives. The Government will provide an agenda, meeting goals, meeting place, and meeting time to participants prior to the meeting.

3.1.2.2. The post award conference shall include determination and introduction of contact persons, their authorities, contract administration requirements, discussion of expected project progress processes, and coordination of subsequent meetings for quality control (see Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL), Partnering (see below and SCR: Partnering), and the initial design conference (see below).

3.1.2.3. The government will introduce COE project delivery team members, facility users, facility command representatives, and installation representatives. The DB Contractor shall introduce major subcontractors, and other needed staff. Expectations and duties of each person shall be defined for all participants. A meeting roster shall be developed and distributed by the government with complete contact information including name, office, project role, phone, mailing and physical address, and email address.

3.1.3. Partnering & Project Progress Processes

3.1.3.1. The initial Partnering conference may be scheduled and conducted at any time with or following the post award conference. The Government proposes to form a partnership with the DB Contractor to develop a cohesive building team. This partnership will involve the COE project delivery team members, facility users, facility command representatives, installation representatives, Designers of Record, major subcontractors, contractor quality control staff, and contractor construction management staff. This partnership will strive to develop a cooperative management team drawing on the strengths of each team member in an effort to achieve a quality project within budget and on schedule. This partnership will be bilateral in membership and participation will be totally voluntary. All costs, excluding labor and travel expenses, shall be shared equally between the Government and the Contractor. The Contractor and Government shall be responsible for their own labor and travel costs. Normally, partnering meetings will be held at or in the vicinity of the project installation.

3.1.3.2. As part of the partnering process, the Government and Contractor shall develop, establish, and agree to comprehensive design development processes including conduct of conferences, expectations of design development at conferences, fast-tracking, design acceptance, Structural Interior Design (SID)/ Furniture, Fixtures & Equipment (FF&E) design approval, project closeout, etc. The government will explain contract requirements and the DB Contractor shall review their proposed project schedule and suggest ways to streamline processes.

3.1.4. Initial Design Conference

The initial design conference may be scheduled and conducted at the project installation any time after the post award conference, although it is recommended that the partnering process be initiated with or before the initial design conference. Any design work conducted after award and prior to this conference should be limited to site and is discouraged for other items. All Designers of Record shall participate in the conference. The purpose of the meeting is to introduce everyone and to make sure any needs the contractor has are assigned and due dates established as well as who will get the information. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning the BIM Implementation Plan demonstration at this meeting. The DB Contractor shall conduct the initial design conference.

3.1.5. Pre-Construction Conference

Before starting construction activities, the Contractor and Government will jointly conduct a pre-construction administrative conference to discuss any outstanding requirements and to review local installation requirements for start of construction. It is possible there will be multiple Pre-Construction Conferences based on the content of the design packages selected by the Contractor. The Government will provide minutes of this meeting to all participants.

3.2. STAGES OF DESIGN SUBMITTALS AND OVER THE SHOULDER PROGRESS REVIEWS

The stages of design submittals described below define Government expectations with respect to process and content. The Contractor shall determine how to best plan and execute the design and review process for this project, within the parameters listed below. As a minimum, the Government expects to see at least one interim design submittal, at least one final design submittal before construction of a design package may proceed and at least one Design Complete submittal that documents the accepted design. The Contractor may sub-divide the design into separate packages for each stage of design and may proceed with construction of a package after the Government accepts the final design for that package. See discussion on waivers to submission of one or more intermediate design packages where the parties partner during the design process. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning BIM and the various stages of design submittals and over-the-shoulder progress reviews.

3.2.1. Site/Utilities

To facilitate fast-track design-construction activities the contractor may submit a final (100%) site and utility design as the first design submittal or it may elect to submit interim and final site and utility design submittals as explained below. Following review, resolution, and incorporation of all Government comments, and submittal of a satisfactory set of site/utility design documents, after completing all other pre-construction requirements in this contract and after the pre-construction meeting, the Government will allow the Contractor to proceed with site development activities, including demolition where applicable, within the parameters set forth in the accepted design submittal. For the first site and utility design submission, whether an interim or final, the submittal review, comment, and resolution times from this specification apply, except that the Contractor shall allow the Government a 14 calendar day review period, exclusive of mailing time. No on-site construction activities shall begin prior to written Government clearance to proceed.

3.2.2. Interim Design Submittals

The Contractor may submit either a single interim design for review, representing a complete package with all design disciplines, or split the interim design into smaller, individual design packages as it deems necessary for fast-track construction purposes. As required in Section 01 32 01.00 10 PROJECT SCHEDULE, the Contractor shall schedule its design and construction packaging plan to meet the contract completion period. This submission is the Government's primary opportunity to review the design for conformance to the solicitation and to the accepted contract proposal and to the Building Codes at a point where required revisions may be still made, while minimizing lost design effort to keep the design on track with the contract requirements. The requirements for the interim design review submittals and review conferences are described hereinafter. This is not necessarily a hold point for the design process; the Contractor may designate the interim design submittal(s) as a snapshot and proceed with design development at its own risk. See below for a waiver, where the parties establish an effective over-the-shoulder progress review procedure through the partnering process that would eliminate the need for or expedite a formal intermediate design review on one or more individual design packages.

3.2.3. Over-the-Shoulder Progress Reviews

To facilitate a streamlined design-build process, the Government and the Contractor may agree to one-on-one reviewer or small group reviews, electronically, on-line (if available within the Contractor's standard design practices) or at the Contractor's design offices or other agreed location, when practicable to the parties. The Government and Contractor will coordinate such reviews to minimize or eliminate disruptions to the design process. Any data required for these reviews shall normally be provided in electronic format, rather than in hard copy. If the Government and Contractor establish and implement an effective, mutually agreeable partnering procedure for regular (e.g., weekly) over-the-shoulder review procedures that allow the Government reviewers the opportunity to keep fully informed of the progress, contents, design intent, design documentation, etc. of the design package, the Government will agree to waive or to expedite the formal intermediate design review period for that package. The Contractor shall still be required to submit the required intermediate design documentation, however the parties may agree to how that material will be provided, in lieu of a formal consolidated submission of the package. It should be noted that Government funding is extremely limited for non-local travel by design reviewers, so the maximum use of virtual teaming methods must be used. Some possible examples include electronic file sharing, interactive software with on-line or telephonic conferencing, televideo conferencing, etc. The Government must still perform its Code and Contract conformance reviews, so the Contractor is encouraged to partner with the reviewers to find ways to facilitate this process and to facilitate meeting or bettering the design-build schedule. The Contractor shall maintain a fully functional configuration management system as described herein to track design revisions, regardless of whether or not there is a need for a formal intermediate design review. The formal intermediate

review procedures shall form the contractual basis for the official schedule, in the event that the partnering process determines that the formal intermediate review process to be best suited for efficient project execution. However, the Government pledges to support and promote the partnering process to work with the Contractor to find ways to better the design schedule.

3.2.4. Final Design Submissions

This submittal is required for each design package prior to Government acceptance of that design package for construction. The requirements for the final design submittal review conferences and the Government's acceptance for start of construction are described herein after.

3.2.5. Design Complete Submittals

After the final design submission and review conference for a design package, revise the design package to incorporate the comments generated and resolved in the final review conferences, perform and document a back-check review and submit the final, design complete documents, which shall represent released for construction documents. The requirements for the design complete submittals are described hereinafter.

3.2.6. Holiday Periods for Government Review or Actions

Do not schedule meetings, Government reviews or responses during the last two weeks of December or other designated Government Holidays (including Friday after Thanksgiving). Exclude such dates and periods from any durations specified herein for Government actions.

3.2.7. Late Submittals and Reviews

If the Contractor cannot meet its scheduled submittal date for a design package, it must revise the proposed submittal date and notify the government in writing, at least one (1) week prior to the submittal, in order to accommodate the Government reviewers' other scheduled activities. If a design submittal is over one (1) day late in accordance with the latest revised design schedule, or if notification of a proposed design schedule change is less than seven (7) days from the anticipated design submission receipt date, the Government review period may be extended up to seven (7) days due to reviewers' schedule conflicts. If the Government is late in meeting its review commitment and the delay increases the Contractor's cost or delays completion of the project, the Suspension of Work and Defaults clauses provide the respective remedy or relief for the delay.

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

Develop and maintain effective, acceptable design configuration management (DCM) procedures to control and track all revisions to the design documents after the Interim Design Submission through submission of the As-Built documents. During the design process, this will facilitate and help streamline the design and review schedule. After the final design is accepted, this process provides control of and documents revisions to the accepted design (See Special Contract Requirement: Deviating From the Accepted Design). The system shall include appropriate authorities and concurrences to authorize revisions, including documentation as to why the revision must be made. The DCM data shall be available to the Government reviewers at all times. The Contractor may use its own internal system with interactive Government concurrences, where necessary or may use the Government's "DrChecks Design Review and Checking System" (see below and Attachment C).

3.3.2. Tracking Design Review Comments

Although the Contractor may use its own internal system for overall design configuration management, the Government and the Contractor shall use the DrChecks Design Review and Checking System to initiate, respond to, resolve and track Government design compliance review comments. This system may be useful for other data which needs to be interactive or otherwise available for shared use and retrieval. See Attachment C for details on how to establish an account and set-up the DrChecks system for use on the project.

3.3.3. Design and Code Checklists

Develop and complete various discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists with each design submittal, as applicable, as part of the project documentation. See Section 01 45 04.00 10 Contractor Quality Control, Attachment D for a Sample Fire Protection and Life Safety Code review checklist and Attachment E for LEED SUBMITTALS.

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

At least one interim design submittal, review and review conference is required for each design package (except that, per paragraph 3.2.1, the Contractor may skip the interim design submission and proceed directly to final design on the sitework and utilities package). The DB Contractor may include additional interim design conferences or over-the-shoulder reviews, as needed, to assure continued government concurrence with the design work. Include the interim submittal review periods and conferences in the project schedule and indicate what part of the design work is at what percentage of completion. The required interim design conferences shall be held when interim design requirements are reached as described below. See also Paragraph: **Over-the-Shoulder Progress Reviews** for a waiver to the formal interim design review.

3.4.2. Procedures

After receipt of an Interim Design submission, allow the Government fourteen (14) calendar days after receipt of the submission to review and comment on the interim design submittal. For smaller design packages, especially those that involve only one or a few separate design disciplines, the parties may agree on a shorter review period or alternative review methods (e.g., over-the-shoulder or electronic file sharing), through the partnering process. For each interim design review submittal, the COR will furnish, to the Contractor, a single consolidated, validated listing of all comments from the various design sections and from other concerned agencies involved in the review process using the DrChecks Design Review and Checking System. The review will be for conformance with the technical requirements of the solicitation and the Contractor's RFP proposal. If the Contractor disagrees technically with any comment or comments and does not intend to comply with the comment, he/she must clearly outline, with ample justification, the reasons for noncompliance within five (5) days after receipt of these comments in order that the comment can be resolved. Furnish disposition of all comments, in writing, through DrChecks. The Contractor is cautioned that if it believes the action required by any comment exceeds the requirements of this contract, that it should take no action and notify the COR in writing immediately. The Interim Review conference will be held for each design submittal at the installation. Bring the personnel that developed the design submittal to the review conference. The conference will take place the week after the receipt of the comments by the Contractor. For smaller fast-track packages that involve only a few reviewers, the parties may agree to alternative conferencing methods, such as teleconferencing, or televideo, where available, as determined through Partnering.

3.4.3. Conference Documentation

3.4.3.1. In order to facilitate and accelerate the Government code and contract conformance reviews, identify, track resolution of and maintain all comments and action items generated during the design process and make this available to the designers and reviewers prior to the Interim and subsequent design reviews.

3.4.3.2. The DB Contractor shall prepare meeting minutes and enter final resolution of all comments into DrChecks. Copies of comments, annotated with comment action agreed on, will be made available to all parties before the conference adjourns. Unresolved problems will be resolved by immediate follow-on action at the end of conferences. Incorporate valid comments. The Government reserves the right to reject design document submittals if comments are significant. Participants shall determine if any comments are critical enough to require further design development prior to government concurrence. Participants shall also determine how to proceed in order to obtain government concurrence with the design work presented.

3.5. INTERIM DESIGN REQUIREMENTS

Interim design deliverables shall include drawings, specifications, and design analysis for the part of design that the Contractor considers ready for review.

3.5.1. Drawings

Include comments from any previous design conferences incorporated into the documents to provide an interim design for the "part" submitted.

3.5.2. Design Analyses

3.5.2.1. The designers of record shall prepare and present design analyses with calculations necessary to substantiate and support all design documents submitted. Address design substantiation required by the applicable codes and references and pay particular attention to the following listed items:

3.5.2.2. For parts including sitework, include site specific civil calculations.

3.5.2.3. For parts including structural work, include structural calculations.

- (a) Identify all loads to be used for design.
- (b) Describe the method of providing lateral stability for the structural system to meet seismic and wind load requirements. Include sufficient calculations to verify the adequacy of the method.
- (c) Provide calculations for all principal roof, floor, and foundation members and bracing and secondary members.
- (d) Provide complete seismic analyses for all building structural, mechanical, electrical, architectural, and building features as dictated by the seismic zone for which the facility is being constructed.
- (e) Computer generated calculations must identify the program name, source, and version. Provide input data, including loads, loading diagrams, node diagrams, and adequate documentation to illustrate the design. The schematic models used for input must show, as a minimum, nodes/joints, element/members, materials/properties, and all loadings, induced settlements/deflections, etc., and a list of load combinations. Include an output listing for maximum/minimum stresses/forces and deflections for each element and the reactions for each loading case and combination.
- (f) See also the Security (Anti-Terrorism) requirements below for members subject to Anti-Terrorist Force Protection (ATFP) and Progressive Collapse requirements.
- (g) Fully coordinate and integrate the overall structural design between two different or interfacing construction types, such as modular and stick-built or multistory, stacked modular construction. Provide substantiation of structural, consolidation/settlement analysis, etc., as applicable, through the interfaces.

3.5.2.4. For Security (Anti-Terrorism): Provide a design narrative and calculations where applicable, demonstrating compliance with each of the 22 standards in UFC 4-010-01, which includes Design of Buildings to Resist Progressive Collapse (use the most recent version of UFC 4-023-03, regardless of references to any specific version in UFC 4-010-01). Where sufficient standoff distance is not being provided, show calculations for blast resistance of the structural system and building envelope. Show complete calculations for members subjected to ATFP loads, e.g., support members of glazed items (jambes, headers, sills) connections of windows to support members and connections of support members to the rest of the structure. For 3 story and higher buildings, provide calculations to demonstrate compliance with progressive collapse requirements.

3.5.2.5. For parts including architectural work, include building floor area analysis.

3.5.2.6. For parts including mechanical work, include HVAC analysis and calculations. Include complete design calculations for mechanical systems. Include computations for sizing equipment, compressed air systems, air duct design, and U-factors for ceilings, roofs and exterior walls and floors. Contractor shall employ commercially available energy analysis techniques to determine the energy performance of all passive systems and features. Use of hourly energy load computer simulation is required (see paragraph 3.5.5.2 for list of acceptable software). Based on the results of calculations, provide a complete list of the materials and equipment proposed with the manufacturer's published cataloged product installation specifications and roughing-in data.

3.5.2.7. For parts including life safety, include building code analysis and sprinkler and other suppression systems. Notwithstanding the requirements of the Codes, address the following:

- (a) A registered fire protection engineer (FPE) must perform all fire protection analyses. Provide the fire protection engineer's qualifications. See Section 01 10 00, paragraph 5 for qualifications.

- (b) Provide all references used in the design including Government design documents and industry standards used to generate the fire protection analysis.
- (c) Provide classification of each building in accordance with fire zone, building floor areas and height and number of stories.
- (d) Provide discussion and description of required fire protection requirements including extinguishing equipment, detection equipment, alarm equipment and water supply. Alarm and detection equipment shall interface to requirements of Electronic Systems.
- (e) Provide hydraulic calculations based on water flow test for each sprinkler system to insure that flow and pressure requirements can be met with current water supply. Include copies of Contractor's water flow testing done to certify the available water source.

3.5.2.8. For parts including plumbing systems:

- (a) List all references used in the design.
- (b) Provide justification and brief description of the types of plumbing fixtures, piping materials and equipment proposed for use.
- (c) Detail calculations for systems such as sizing of domestic hot water heater and piping; natural gas piping; LP gas piping and tanks, fuel oil piping and tanks, etc., as applicable.
- (d) When the geotechnical report indicates expansive soils are present, indicate in the first piping design submittal how piping systems will be protected against damage or backfall/backflow due to soil heave (from penetration of slab to the 5 foot building line).

3.5.2.9. For elevator systems:

- (a) List all criteria codes, documents and design conditions used.
- (b) List any required permits and registrations for construction of items of special mechanical systems and equipment.

3.5.2.10. For parts including electrical work, include lighting calculations to determine maintained foot-candle levels, electrical load analysis and calculations, electrical short circuit and protective device coordination analysis and calculations and arc fault calculations.

3.5.2.11. For parts including telecommunications voice/data (including SIPRNET, where applicable), include analysis for determining the number and placement of outlets

3.5.2.12. For Cathodic Protection Systems, provide the following stamped report by the licensed corrosion engineer or NACE specialist with the first design submission. The designer must be qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. He/she must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection Specialist, or must be a registered professional engineer with a minimum of five years experience in corrosion control and cathodic protection. Clearly describe structures, systems or components in soil or water to be protected. Describe methods proposed for protection of each.

3.5.3. Geotechnical Investigations and Reports:

3.5.3.1. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal. Make this information available as early as possible during the over-the-shoulder progress review process. Summarize the subsurface conditions and provide recommendations for the design of appropriate utilities, foundations, floor slabs, retaining walls, embankments, and pavements. Include compaction requirements for fill and backfill under buildings, sidewalks, other structures and open areas. Recommend foundation systems to be used, allowable bearing pressures for footings, lateral load resistance capacities for foundation systems, elevations for footings, grade beams, slabs, etc. Provide an assessment of post-construction settlement potential including total and differential. Provide recommendations regarding lateral earth pressures (active, at-rest, passive) to be used in the design of retaining walls. Include the recommended spectral accelerations and Site Class for seismic design along with an evaluation of any seismic hazards and recommendations for mitigation, if required. Include calculations to support the recommendations for bearing capacity, settlement, and pavement sections. Include supporting documentation for all recommended

design parameters such as Site Class, shear strength, earth pressure coefficients, friction factors, subgrade modulus, California Bearing Ratio (CBR), etc. Provide earthwork recommendations, expected frost penetration, expected groundwater levels, recommendations for dewatering and groundwater control and the possible presence of any surface or subsurface features that may affect the construction of the project such as sinkholes, boulders, shallow rock, old fill, old structures, soft areas, or unusual soil conditions. Include pH tests, salinity tests, resistivity measurements, etc., required to design corrosion control and grounding systems. Include the raw field data. Arrange a meeting with the Government subsequent to completion and evaluation of the site specific geotechnical exploration to outline any differences encountered that are inconsistent with the Government provided preliminary soils information. Clearly outline differences which require changes in the foundation type, or pavement and earthwork requirements from that possible and contemplated using the Government furnished preliminary soils investigation, which result in a change to the design or construction. Any equitable adjustment is subject to the provisions of the contract's Differing Site Conditions Clause.

3.5.3.2. Vehicle Pavements: The Contractor's geotechnical report shall contain flexible and rigid pavement designs, as applicable for the project, including design CBR and modulus of subgrade reaction and the required compaction effort for subgrades and pavement layers. Provide Information on the types of base course materials available in the area and design strengths.

3.5.3.3. The Contractor and the professional geotechnical engineer consultant shall certify in writing that the design of the project has been developed consistent with the Contractor's final geotechnical report. The certification shall be stamped by the consulting professional geotechnical engineer and shall be submitted with the first design submission. If revisions are made to the initial design submission, a new certification shall be provided with the final design submission.

3.5.4. LEED Documentation:

Assign a LEED Accredited Professional, responsible to track LEED planning, performance and documentation for each LEED credit through construction closeout. Incorporate LEED credits in the plans, specifications and design analyses. Develop LEED supporting documentation as a separable portion of the Design Analysis and provide with each required design submittal. Include the LEED Project checklist for each non-exempt facility (one checklist may be provided for multiple facilities in accordance with the LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects and the LEED SUBMITTALS (Attachment E, herein) with each submittal. Final design submittal for each portion of the work must include all required design documentation relating to that portion of work (example - all site credit design documents with final site design). Submittal requirements are as indicated in Attachment E, LEED SUBMITTALS. Submit all documentation indicated on Attachment E as due at final design at final design submittal (for fast-track projects with multiple final design submittals, this shall be at the last scheduled final design submittal). All project documentation related to LEED shall conform to USGBC requirements for both content and format, including audit requirements and be separate from other design analyses. Maintain and update the LEED documentation throughout project progress to construction closeout and shall compile product data, receipts, calculations and other data necessary to substantiate and support all credits claimed. The Government may audit any or all individual credits. Audit documentation is not required to be submitted unless requested. These requirements apply to all projects. If the project requires the Contractor to obtain USGBC certification, the Contractor shall also be responsible for obtaining USGBC certification and shall provide written evidence of certification with the construction closeout LEED documentation submittal. Install the USGBC building plaque at the location indicated by the Government upon receipt. If Contractor obtains USGBC interim design review, submit the USGBC review to the Government within 30 days of receipt for information only.

3.5.4.1. LEED Documentation for Technology Solution Set. If the Solicitation provides a Prescriptive Technology Solution Set, use of the Technology Solution set has no effect on LEED documentation requirements. Provide all required LEED documentation, including energy analysis, in accordance with LEED requirements when using the Technology Solution Set.

3.5.5. Energy Conservation:

3.5.5.1. Refer to Section 01 10 00, Paragraph 5. Interim and Final Design submittals shall demonstrate that each building including the building envelope, HVAC systems, service water heating, power, and lighting systems meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Use Compliance Documentation forms available from ASHRAE and included in the ASHRAE 90.1 User's Manual for this purpose. The Architectural Section of the Design Analysis shall include completed forms titled "Building Envelope

Compliance Documentation Parts I and II". The Heating Ventilating and Air Conditioning (HVAC) Section of the Design Analysis shall include a completed form titled "HVAC Simplified Approach Option - Part I" if this approach is allowed by the Standard. Otherwise, the HVAC Section of the Design Analysis shall include completed forms titled "HVAC Mandatory Provisions - Part II" and "HVAC Prescriptive Requirements - Part III". The Plumbing Section of the Design Analysis shall include a completed form titled "Service Water Heating Compliance Documentation". The Electrical Section of the Design Analysis shall include an explanatory statement on how the requirements of ASHRAE 90.1-2004 Chapter 8 Power were met. The Electrical Section of the Design Analysis shall also include a completed form titled "Lighting Compliance Documentation".

3.5.5.2. Interim and Final Design submittals which address energy consuming systems, (heating, cooling, service hot water, lighting, power, etc.) must also include calculations in a separate Energy Conservation Section of the Design Analysis which demonstrate and document (a) the baseline energy consumption for the facility or facilities under contract, that would meet the requirements of ANSI/ASHRAE/IESNA Standard 90.1 and (b) the energy consumption of the facility or facilities under contract utilizing the materials and methods required by this construction contract. Use the USGBC Energy and Atmosphere (EA) Credit 1 compliance template / form or an equivalently detailed form for documenting compliance with the energy reduction requirements. This template / form is titled PERFORMANCE RATING METHOD and is available when the project is registered for LEED. The calculation methodology used for this documentation and analysis shall follow the guidelines set forth in Appendix G of ASHRAE 90.1, with two exceptions: a) receptacle and process loads may be omitted from the calculation; and b) the definition of the terms in the formula for Percentage Improvement found in paragraph G1.2 are modified as follows: Baseline Building Performance shall mean the annual energy consumption calculated for a building design intended for use as a baseline for rating above standard design meeting the minimum requirements of the energy standard, and Proposed Building Performance shall mean annual energy consumption calculated for the proposed building design intended for construction. This calculation shall address all energy consuming systems in a single integrated methodology. Include laboratory fume hoods and kitchen ventilation loads in the energy calculation. They are not considered process loads. Individual calculations for heating, cooling, power, lighting, power, etc. systems will not be acceptable. The following building simulation software is acceptable for use in calculating building energy consumption: Hourly Analysis Program (HAP) by Carrier Corp., TRACE 700 by Trane Corp., DOE-2 by US Department of Energy, EnergyPlus by DOD/DOE.

3.5.6. Specifications

Specifications may be any one of the major, well known master guide specification sources (use only one source) such as MASTERSPEC from the American Institute of Architects, SPECTEXT from Construction Specification Institute or Unified Facility Guide Specifications (UFGS using MASTERFORMAT 2004 numbering system), etc. (including specifications from these sources). Manufacturers' product specifications, utilizing CSI's Manu-Spec, three part format may be used in conjunction with the selected specifications. The designers of record shall edit and expand the appropriate Specifications to insure that all project design requirements, current code requirements, and regulatory requirements are met. Specifications shall clearly identify, where appropriate, specific products chosen to meet the contract requirements (i.e., manufacturers' brand names and model numbers or similar product information).

3.5.7. Building Rendering

Present and provide a draft color computer, artist, or hand drawn rendering with the conceptual design submittal of the building exterior. Perspective renderings shall include a slightly overhead view of the entire building to encompass elevations and the roof configuration of the building. After Government review and acceptance, provide a final rendering, including the following:

Three (3) 18" x 24" color prints, framed and matted behind glass with project title underneath the print.

One (1) Image file (high resolution) in JPG format on CD for those in the submittal distribution list.

3.5.8. Interim Building Design Contents

The following list represents what the Government considers should be included in the overall completed design for a facility or project. It is not intended to limit the contractor from providing different or additional information as needed to support the design presented, including the require design analyses discussed above. As the Contractor develops individual design packages and submits them for Interim review, include as much of the applicable

information for an individual design package as is developed at the Interim design level for review purposes. These pieces shall be developed as the design progresses toward the design complete stage.

3.5.8.1. Lawn and Landscaping Irrigation System

3.5.8.2. Landscape, Planting and Turfing

3.5.8.3. Architectural

- (a) Design Narrative
- (b) Architectural Floor Plans, Typical Wall and Roof Sections, Elevations
- (c) Finish schedule
- (d) All required equipment
- (e) Special graphics requirements
- (f) Door and Window Schedules
- (g) Hardware sets using BHMA designations
- (h) Composite floor plan showing all pre-wired workstations
- (i) Structural Interior Design (SID) package: See ATTACHMENT A for specific requirements
- (j) Furniture, Fixtures & Equipment (FF&E) design package: See ATTACHMENT B for specific requirements

3.5.8.4. Structural Systems. Include:

- (a) Drawings showing principal members for roof and floor framing plans as applicable
- (b) Foundation plan showing main foundation elements where applicable
- (c) Typical sections for roof, floor, and foundation conditions

3.5.8.5. Plumbing Systems

- (a) Show locations and general arrangement of plumbing fixtures and major equipment
- (b) Plan and isometric riser diagrams of all areas including hot water, cold water, waste and vent piping. Include natural gas (and meter as required), (natural gas and meter as required), (LP gas), (fuel oil) and other specialty systems as applicable.
- (c) Include equipment and fixture connection schedules with descriptions, capacities, locations, connection sizes and other information as required

3.5.8.6. HVAC Systems

- (a) Mechanical Floor Plans: The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plans shall also show the following:
 - (1) Room designations.
 - (2) Mechanical legend and applicable notes.
 - (3) Location and size of all ductwork and piping.
 - (4) Location and capacity of all terminal units (i.e., registers, diffusers, grilles, hydronic baseboards).
 - (5) Pre-Fabricated Paint Spray Booth (where applicable to project scope)
 - (6) Paint Preparation Area (where applicable to project scope)
 - (7) Exhaust fans and specialized exhaust systems.
 - (8) Thermostat location.
 - (9) Location of heating/cooling plant (i.e., boiler, chiller, cooling tower, etc).
 - (10) Location of all air handling equipment.

- (11) Air balancing information.
- (12) Flue size and location.
- (13) Piping diagram for forced hot water system (if used).
- (b) Equipment Schedule: Provide complete equipment schedules. Include:
 - (1) Capacity
 - (2) Electrical characteristics
 - (3) Efficiency (if applicable)
 - (4) Manufacturer's name
 - (5) Optional features to be provided
 - (6) Physical size
 - (7) Minimum maintenance clearances
- (a) Details: Provide construction details, sections, elevations, etc., only where required for clarification of methods and materials of design.
- (b) HVAC Controls: Submit complete HVAC controls equipment schedules, sequences of operation, wiring and logic diagrams, Input/Output Tables, equipment schedules, and all associated information. See the Statement of Work for additional specific requirements.

3.5.8.7. Fire Protection and Life Safety.

- (a) Provide plan for each floor of each building that presents a compendium of the total fire protection features being incorporated into the design. Include the following types of information:
 - (1) The location and rating of any fire-resistive construction such as occupancy separations, area separations, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways, etc.
 - (2) The location and coverage of any fire detection systems
 - (3) The location and coverage of any fire suppression systems (sprinkler risers, standpipes, etc.)
 - (4) The location of any other major fire protection equipment
 - (5) Indicate any hazardous areas and their classification
 - (6) Schedule describing the internal systems with the following information: fire hazard and occupancy classifications, building construction type, GPM/square foot sprinkler density, area of operation and other as required
- (b) Working plans and all other materials submitted shall meet NFPA 13 requirements, with respect to required minimum level of detail.

3.5.8.8. Elevators. Provide:

- (a) Description of the proposed control system
- (b) Description, approximate capacity and location of any special mechanical equipment for elevators.

3.5.8.9. Electrical Systems.

- (a) Electrical Floor Plan(s): Show all principle architectural features of the building which will affect the electrical design. Show the following:
 - (1) Room designations.
 - (2) Electrical legend and applicable notes.
 - (3) Lighting fixtures, properly identified.
 - (4) Switches for control of lighting.
 - (5) Receptacles.

- (6) Location and designation of panelboards. Clearly indicate type of mounting required (flush or surface) and reflect accordingly in specifications.
- (7) Service entrance (conduit and main disconnect).
- (8) Location, designation and rating of motors and/or equipment which requires electrical service. Show method of termination and/or connection to motors and/or equipment. Show necessary junction boxes, disconnects, controllers (approximate only), conduit stubs, and receptacles required to serve the motor and/or equipment.
- (b) Building Riser Diagram(s) (from pad-mounted transformer to unit load center panelboard): Indicate the types and sizes of electrical equipment and wiring. Include grounding and metering requirements.
- (c) Load Center Panelboard Schedule(s): Indicate the following information:
 - (1) Panelboard Characteristics (Panel Designation, Voltage, Phase, Wires, Main Breaker Rating and Mounting.
 - (2) Branch Circuit Designations.
 - (3) Load Designations.
 - (4) Circuit Breaker Characteristics. (Number of Poles, Trip Rating, AIC Rating)
 - (5) Branch Circuit Connected Loads (AMPS).
 - (6) Special Features
- (d) Lighting Fixture Schedule(s): Indicate the following information:
 - (1) Fixture Designation.
 - (2) General Fixture Description.
 - (3) Number and Type of Lamp(s).
 - (4) Type of Mounting.
 - (5) Special Features.
- (e) Details: Provide construction details, sections, elevations, etc. only where required for clarification of methods and materials of design.

3.5.8.10. Electronic Systems including the following responsibilities:

- (a) Fire Detection and Alarm System. Design shall include layout drawings for all devices and a riser diagram showing the control panel, annunciator panel, all zones, radio transmitter and interfaces to other systems (HVAC, sprinkler, etc.)
- (b) Fire Suppression System Control. Specify all components of the Fire Suppression (FS) System in the FS section of the specifications. Clearly describe how the system will operate and interact with other systems such as the fire alarm system. Include a riser diagram on the drawings showing principal components and interconnections with other systems. Include FS system components on drawing legend. Designate all components shown on floor plans "FS system components" (as opposed to "Fire Alarm components"). Show location of FS control panels, HVAC control devices, sensors, and 120V power panel connections on floor plans. Indicate zoning of areas by numbers (1, 2, 3) and detectors sub-zoned for cross zoning by letter designations (A and B). Differentiate between ceiling mounted and under floor detectors with distinct symbols and indicate sub-zone of each.
- (c) Public Address System
- (d) Special Grounding Systems. Completely reflect all design requirements in the specifications and drawings. Specifications shall require field tests (in the construction phase), witnessed by the Government, to determine the effectiveness of the grounding system. Include drawings showing existing construction, if any.
- (e) Cathodic Protection.
- (f) Intrusion Detection, Card Access System
- (g) Central Control and Monitoring System
- (h) Mass Notification System
- (i) Electrical Power Distribution Systems

3.5.8.11. Information Systems including the following responsibilities:

- (a) Telecommunications Cabling
- (b) Supporting Infrastructure
- (a) Outside Plant (OSP) Cabling - Campus or Site Plans - Exterior Pathways and Inter-Building Backbones
 - (a) Include a layout of the voice/data outlets (including voice only wall & pay phones) on telecommunication floor plan drawing, location of SIPRNET data outlets (where applicable), and a legend and symbol definition to indicate height above finished floor. Show size of conduit and cable type and size on Riser Diagram. Do not show conduit runs between backboard and outlets on the floor plans. Show underground distribution conduit and cable with sizing from point of presence to entrance facility of building.
 - (b) Layout of complete building per floor - Serving Zone Boundaries, Backbone Systems, and Horizontal Pathways including Serving Zones Drawings - Drop Locations and Cable ID's
 - (c) Communication Equipment Rooms - Plan Views - Tech and AMEP/Elevations - Racks and Walls. Elevations with a detailed look at all telecom rooms. Indicate technology layout (racks, ladder-racks, etc.), mechanical/electrical layout, rack elevation and backboard elevation. They may also be an enlargement of a congested area of T1 or T2 series drawing.

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

A final design review and review conference will be held upon completion of final design at the project installation, or – where equipment is available - by video teleconference or a combination thereof, for any design package to receive Government acceptance to allow release of the design package for construction. For smaller separate design packages, the parties may agree on alternative reviews and conferences (e.g., conference calls and electronic file sharing, etc.) through the Partnering process. Include the final design conference in the project schedule and shall indicate what part of the design work is at 100% completion. The final design conference will be held after the Government has had seven (7) calendar days after receipt of the submission to review the final design package and supporting data. For smaller packages, especially those involving only one or a few design disciplines the parties may agree on a shorter period.

3.7. FINAL DESIGN REQUIREMENTS

Final design deliverables for a design package shall consist of 100% complete drawings, specifications, submittal register and design analyses for Government review and acceptance. The 100% design submission shall consist of drawings, specifications, updated design analyses and any permits required by the contract for each package submitted. In order to expedite the final design review, prior to the conference, ensure that the design configuration management data and all review comment resolutions are up-to-date. Include the 100% SID and 100% FF&E binders for government approval. The Contractor shall have performed independent technical reviews (ITR's) and back-checks of previous comment resolutions, as required by Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL, including providing documentation thereof.

3.7.1. Drawings

3.7.1.1. Submit drawings complete with all contract requirements incorporated into the documents to provide a 100% design for each package submitted.

3.7.1.2. Prepare all drawings with the Computer-Aided Design and Drafting (CADD)/Computer-Aided Design (CAD) system, organized and easily referenced electronically, presenting complete construction information.

3.7.1.3. Drawings shall be complete. The Contractor is encouraged to utilize graphics, views, notes, and details which make the drawings easier to review or to construct but is also encouraged to keep such materials to those that are necessary.

3.7.1.4. Provide detail drawings that illustrate conformance with the contract. Include room finish schedules, corresponding color/finish/special items schedules, and exterior finish schedules that agree with the submitted SID binders.

3.7.1.5. The design documents shall be in compliance with the latest version of the A/E/C CADD Standard, available at <https://caddbim.usace.army.mil/CAD>. Use the approved vertical Corps of Engineers title blocks and borders on all drawings with the appropriate firm name included within the title block area.

3.7.1.6. CAD System and Building Information Modeling (BIM) (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order.)

All CAD files shall be fully compatible with MicroStation V8 or higher. Save all design CAD files as MicroStation V8 or higher files. All submitted BIM Models and associated Facility Data shall be fully compatible with Bentley BIM file format and the USACE Bentley BIM v8 Workspace.

(a) CAD Data Final File Format: During the design development capture geo-referenced coordinates of all changes made to the existing site (facility footprint, utility line installations and alterations, roads, parking areas, etc) as a result of this contract. There is no mandatory methodology for how the geo-referenced coordinates will be captured, however, Engineering and Construction Bulletin No. 2006-15, Subject: Standardizing Computer Aided Design (CAD) and Geographic Information Systems (GIS) Deliverables for all Military Design and Construction Projects identifies the format for final as-built drawings and data sets to be delivered to the government. Close-out requirements at the as-built stage; require final geo-referenced GIS Database of the new facility along with all exterior modifications. The Government will incorporate this data set into the Installation's GIS Masterplan or Enterprise GIS System. See also, Section 01 78 02.00 10 Closeout Submittals.

(b) Electronic Drawing Files: In addition to the native CAD design files, provide separate electronic drawing files (in editable CAD format and Adobe Acrobat PDF version 7.0 or higher) for each project drawing.

(c) Each file (both CAD and PDF) shall represent one complete drawing from the drawing set, including the date, submittal phase, and border. Each drawing file shall be completely independent of any data in any other file, including fonts and shapes not included with the basic CAD software program utilized. Drawing files with external references or special fonts are not acceptable. All displayed graphic elements on all levels of the drawing files shall be part of the project drawing image. The drawing files shall not contain any graphic element that is not part of the drawing image.

(d) Deliver BIM Model and associated Facility Data files in their native format. At a minimum, BIM files shall address major architecture design elements, major structural components, mechanical systems and electrical/communication distribution and elements as defined in Attachment F. See Attachment F for additional BIM requirements.

(e) Drawing Index: Provide an index of drawings sheet in CAD as part of the drawing set, and an electronic list in Microsoft Excel of all drawings on the CD. Include the electronic file name, the sheet reference number, the sheet number, and the sheet title, containing the data for each drawing.

(f) Hard Copies: Plot submitted hard copy drawings directly from the "electronic drawing files" and copy for quantities and sizes indicated in the distribution list at the end of this specification section. The Designers of Record shall stamp, sign and date original hard copy sheets as Released For Construction, and provide copies for distribution from this set.

3.7.2. Design Analyses

3.7.2.1. The designers of record shall update, finalize and present design analyses with calculations necessary to substantiate and support all design documents submitted.

3.7.2.2. The responsible DOR shall stamp, sign and date the design analysis. Identify the software used where, applicable (name, version, vendor). Generally, provide design analyses, individually, in an original (file copy) and one copy for the assigned government reviewer.

3.7.2.3. All disciplines review the LEED design analysis in conjunction with their discipline-specific design analysis; include a copy of the separable LEED design analysis in all design analysis submittals.

3.7.2.4. Do not combine multi-disciplined volumes of design-analysis, unless multiple copies are provided to facilitate multiple reviewers (one copy per each separate design analysis included in a volume).

3.7.3. Specifications

Specifications shall be 100% complete and in final form.

3.7.4. Submittal Register

Prepare and update the Submittal Register and submit it with the 100% design specifications (see Specification Section 01 33 00, SUBMITTAL PROCEDURES) with each design package. Include the required submittals for each specification section in a design package in the submittal register.

3.7.5. Preparation of DD Form 1354 (Transfer of Real Property)

This form itemizes the types, quantities and costs of various equipment and systems that comprise the project, for the purpose of transferring the new construction project from the Corps Construction Division to the Installation's inventory of real property. The Government will furnish the DB Contractor's design manager a DD Form 1354 checklist to use to produce a draft Form 1354. Submit the completed checklist and prepared draft Form DD 1354 with the 100% design in the Design Analysis. The Corps will use these documents to complete the final DD 1354 upon completion of construction.

3.7.6. Acceptance and Release for Construction

3.7.6.1. At the conclusion of the Final Design Review (after resolutions to the comments have been agreed upon between DOR and Government reviewers), the Contracting Officer or the ACO will accept the Final Design Submission for the design package in writing and allow construction to start for that design package. The Government may withhold acceptance until all major corrections have been made or if the final design submission requires so many corrections, even though minor, that it isn't considered acceptably complete.

3.7.6.2. Government review and acceptance of design submittals is for contract conformance only and shall not relieve the Contractor from responsibility to fully adhere to the requirements of the contract, including the Contractor's accepted contract proposal, or limit the Contractor's responsibility of design as prescribed under Special Contract Requirement: "Responsibility of the Contractor for Design" or limit the Government's rights under the terms of the contract. The Government reserves the right to rescind inadvertent acceptance of design submittals containing contract deviations not separately and expressly identified in the submittal for Government consideration and approval.

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

After the Final Design Submission and Review Conference and after Government acceptance of the Final Design submission, revise the design documents for the design package to incorporate the comments generated and resolved in the final review conference, perform and document a back-check review and submit the final, design complete documents. Label the final design complete documents "FOR CONSTRUCTION" or use similar language. In addition to the final drawings and specifications, the following deliverables are required for distribution and field use. The deliverable includes all documentation and supporting design analysis in final form, as well as the final review comments, disposition and the back-check. As part of the quality assurance process, the Government may perform a back-check of the released for construction documentation. Promptly correct any errors or omissions found during the Government back-check. The Government may withhold retainage from progress payments for work or materials associated with a final design package until this submittal has been received and the Government determines that it is complete.

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

General: The documents which the Contractor shall submit to the Government for each submittal are listed and generally described in preceding paragraphs in this Section. Provide copies of each design submittal and design substantiation as follows (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order):

Activity and Address	Drawing Size (Full Size) Half-Size Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) Arch D Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF& .dgn)	Furniture Submittal (FFE)	Structural Interior Design Submittal	BIM Data DVD (Per Attach F)
Commander, U.S.Army Engineer District Kansas City District	2/0	6/0	6/0	4	2	2	0
Commander, U.S.Army Engineer District, Center of Standardization 819 Taylor St Rm 4A05, ATTN Josh Miller, 76102	1/1	1/1	0/0	2	2	2	2
Installation	0/0	10/0	10/0	10	10	10	2
U.S.Army Corps of Engineers Construction Area Office	4/0	3/0	3/0	3	3	3	0
Information Systems Engineering Command (ISEC)	0/0	0/0	0/0	1	1 (Electronic only)	N/A	1
Other Offices	0/0	0/0	0/0	0	0	0	0

***NOTE: For partial sets of drawings, specifications and design analyses, see paragraph 3.9.3.3, below.**

****NOTE: When specified below in 3.9.2, furnish Installation copies of Drawings as paper copies, in lieu of the option to provide secure web-based submittals.**

3.9.2. Web based Design Submittals

Except for full or half-sized drawings for Installation personnel, as designated in the Table above, Web based design submittals will be acceptable as an alternative to the paper copies listed in the Table above, provided a single hard-copy PDF based record set is provided to the Contracting Officer for record purposes. Where the contract requires the Contractor to submit documents to permitting authorities, still provide those authorities paper copies (or in an alternate format where required by the authority). Web based design submittal information shall be provided with adequate security and availability to allow unlimited access those specifically authorized to Government reviewers while preventing unauthorized access or modification. File sizes must be of manageable size for reviewers to quickly download or open on their computers. As a minimum, drawings shall be full scale on American National Standards Institute (ANSI) D sheets (34" x 22"). In addition to the optional website, provide the

BIM data submission on DVD to each activity and address noted above in paragraph 3.9.1 for each BIM submission required in Attachment F.

3.9.3. Mailing of Design Submittals

3.9.3.1. Mail all design submittals to the Government during design and construction, using an overnight mailing service. The Government will furnish the Contractor addresses where each copy shall be mailed to after award of the contract (or individual task order if this is an indefinite delivery/indefinite quantity, task order contract). Mail the submittals to four (4) different addresses. Assemble drawing sheets, specs, design analyses, etc. into individual sets; do not combine duplicate pages from individual sets so that the government has to assemble a set.

3.9.3.2. Each design submittal shall have a transmittal letter accompanying it indicating the date, design percentage, type of submittal, list of items submitted, transmittal number and point of contact with telephone number.

3.9.3.3. Provide partial sets of drawings, specifications, design analyses, etc., as designated in the Table in paragraph 3.9.1, to those reviewers who only need to review their applicable portions of the design, such as the various utilities. The details of which office receives what portion of the design documentation will be worked out after award.

3.10. AS-BUILT DOCUMENTS

Provide as-built drawings and specifications in accordance with Section 01 78 02.00 10, CLOSEOUT SUBMITTALS. Update LEED design phase documentation during construction as needed to reflect construction changes and advancing project completion status (example - Commissioning Plan updates during construction phase) and include updated LEED documentation in construction closeout submittal.

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

1.0 GENERAL INFORMATION

Structural Interior Design includes all building related elements and components generally part of the building itself, such as wall finishes, ceilings finishes, floor coverings, marker/bulletin boards, blinds, signage and built in casework. Develop the SID in conjunction with the furniture footprint.

2.0 STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS

2.1. FORMAT AND SCHEDULE

Prepare and submit for approval an interior and exterior building finishes scheme for an interim design submittal. The DOR shall meet with and discuss the finish schemes with the appropriate Government officials prior to preparation of the schemes to be presented. Present original sets of the schemes to reviewers at an interim design conference.

At the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers, the Contractor may proceed to final design with the interior finishes scheme presented.

The SID information and samples are to be submitted in 8 ½" x 11" format using three ring binders with pockets on the inside of the cover. When there are numerous pages with thick samples, use more than one binder. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 ½". Provide cover and spine inserts sheets identifying the document as "Structural Interior Design" package. Include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Design submittal requirements include, but are not limited to:

2.1.1. Narrative of the Structural Interior Design Objectives

The SID shall include a narrative that discusses the building related finishes. Include topics that relate to base standards, life safety, sustainable design issues, aesthetics, durability and maintainability, discuss the development and features as they relate to the occupants requirements and the building design.

2.1.2. Interior Color Boards

Identify and key each item on the color boards to the contract documents to provide a clear indication of how and where each item will be used. Arrange finish samples to the maximum extent possible by room type in order to illustrate room color coordination. Label all samples on the color boards with the manufacturer's name, patterns and colors name and number. Key or code samples to match key code system used on contract drawings.

Material and finish samples shall indicate true pattern, color and texture. Provide photographs or colored photocopies of materials or fabrics to show large overall patterns in conjunction with actual samples to show the actual colors. Finish samples must be large enough to show a complete pattern or design where practical.

Color boards shall include but not be limited to original color samples of the following:

All walls finishes and ceiling finishes, including corner guards, acrylic wainscoting and wall guards/chair rail finishes

All tile information, including tile grout color and tile patterns.

- All flooring finishes, including patterns.
- All door, door frame finishes and door hardware finishes
- All signage, wall base, toilet partitions, locker finishes and operable/folding partitions and trim

- All millwork materials and finishes (cabinets, counter tops, etc.)
- All window frame finishes and window treatments (sills, blinds, etc.)

Color board samples shall reflect all actual finish textures, patterns and colors required as specified. Patterned samples shall be of sufficient size to adequately show pattern and its repeat if a repeat occurs.

2.1.3. Exterior Color Boards

Prepare exterior finishes color boards in similar format as the interior finishes color boards, for presentation to the reviewers during an interim design conference. Provide original color samples of all exterior finishes including but not limited to the following:

- All Roof Finishes
- All Brick and Cast Stone Samples
- All Exterior Insulation and Finish Samples
- All Glass Color Samples
- All Exterior Metals Finishes
- All Window & Door Frame Finishes
- All Specialty Item Finishes, including trim

Identify each item on the exterior finishes color boards and key to the building elevations to provide a clear indication of how and where each item will be used.

2.2. STRUCTURAL INTERIOR DESIGN DOCUMENTS

2.2.1. General

Structural interior design related drawings must indicate the placement of extents of SID material, finishes and colors and must be sufficiently detailed to define all interior work. The following is a list of minimum requirements:

2.2.2. Finish Color Schedule

Provide finish color schedule(s) in the contract documents. Provide a finish code, material type, manufacturer, series, and color designations. Key the finish code to the color board samples and drawings.

2.2.3. Interior Finish Plans

Indicate wall and floor patterns and color placement, material transitions and extents of interior finishes.

2.2.4. Furniture Footprint Plans

Provide furniture footprint plans showing the outline of all freestanding and systems furniture for coordination of all other disciplines.

2.2.5. Interior Signage

Include interior signage plans or schedules showing location and quantities of all interior signage. Key each interior sign to a quantitative list indicating size, quantity of each type and signage text.

2.2.6. Interior Elevations, Sections and Details

Indicate material, color and finish placement.

ATTACHMENT B FURNITURE, FIXTURES & EQUIPMENT (FF&E) REQUIREMENTS

1.0 FF&E REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS

1.1. FORMAT AND SCHEDULE

Prepare and submit for approval a comprehensive FF&E scheme for an interim design submittal. The Contractor's interior designer, not a furniture dealer, shall develop the design. FF&E is the selection, layout, specification and documentation of furniture includes but is not limited to workstations, seating, tables, storage and shelving, filing, trash receptacles, clocks, framed artwork, artificial plants, and other accessories. Contract documentation is required to facilitate pricing, procurement and installation. The FF&E package is based on the furniture footprint developed in the Structural Interior Design (SID) portion of the interior design. Develop the FF&E package concurrently with the building design to ensure that there is coordination between the electrical outlets, switches, J-boxes, communication outlets and connections, and lighting as appropriate. In addition, coordinate layout with other building features such as architectural elements, thermostats, location of TV's, GF/GI equipment (for example computers, printers, copiers, shredders, faxes), etc. Locate furniture in front of windows only if the top of the item falls below the window and unless otherwise noted, do not attach furniture including furniture systems to the building. If project has SIPRNET and/or NIPRNET, coordinate furniture layout with SIPRNET and NIPRNET separation requirements. Verify that access required by DOIM for SIPRNET box and conduit is provided. The DOR shall interview appropriate Government personnel to determine FF&E requirements for furniture and furnishings prior to preparation of the scheme to be presented. Determine FFE items and quantities by, but not limited to: (1) the number of personnel to occupy the building, (2) job functions and related furniture/office equipment to support the job function, (3) room functions, (4) rank and grade. Present original sets of the scheme to reviewers at an interim design conference upon completion of the interim architectural submittal or three months prior to the submittal of the final FF&E package (whichever comes first).

Design may proceed to final with the FF&E scheme presented at the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers.

Provide six copies of the electronic versions of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide unbound, electronic drawings in CAD and BIM. Provide all files needed to view complete drawings. Submit all text documents in Microsoft Word or Excel..

Submit three copies of the final and complete FF&E information and samples in 8 ½" x 11" format using three ring binders with pockets on the inside of the cover upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first). Use more than one binder when there are numerous pages with thick samples. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out for upholstery and finish boards. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 ½". Provide cover and spine inserts sheets identifying the document as "Furniture, Fixtures & Equipment" package and include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Provide electronic copies of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide six compact disks with all drawings files needed to view the complete drawings unbound and in the latest version AutoCAD. Provide six additional compact disks of all text documents in Microsoft Word or Excel.

Design submittal requirements include, but are not limited to:

1.1.1. Narrative of Interior Design Objectives

Provide a narrative description of the furniture, to include functional, safety and ergonomic considerations, durability, sustainability, aesthetics, and compatibility with the building design.

1.1.2. Furniture Order Form

Prepare one Furnishings Order Form for each item specified in the design. This form identifies all information required to order each individual item. In addition to the project name and location, project number, and submittal phase, the order form must include:

- (a) Furniture item illustration and code
- (b) Furniture item name
- (c) Job name, location, and date
- (d) General Services Administration (GSA) FSC Group, part, and section
- (e) Manufacturer, Product name and Product model number or National Stock Number (NSN)
- (f) Finish name and number (code to finish samples)
- (g) Fabric name and number, minimum Wyzenbeek Abrasion Test double rubs (code to fabric samples)
- (h) Dimensions
- (i) Item location by room number and room name
- (j) Quantity per room
- (k) Total quantity
- (l) Special instructions for procurement ordering and/or installation (if applicable)
- (m) Written Product Description: include a non-proprietary paragraph listing the salient features of the item to include but not limited to:
 - (1) required features and characteristics
 - (2) ergonomic requirements
 - (3) functional requirements
 - (4) testing requirements
 - (5) furniture style
 - (6) construction materials
 - (7) minimum warranty

The following is an example for “m” features and characteristics, ergonomic requirements and functional requirements:

Chair Description:

- (1) Mid-Back Ergonomic Task Chair
- (2) Pneumatic Gaslift; Five Star Base
- (3) Mesh Back; Upholstered Seat
- (4) Height and Width Adjustable Task Arms:
 - a. Arm Height: 6”- 11” (+-1/2”)
 - b. Arm Width: 2”– 4” adjustment
- (5) Height Adjustable Lumbar Support
- (6) Adjustable Seat Height 16”-21” (+- 1”)
- (7) Sliding Seat Depth Adjustment 15”-18” (+-1”)
- (8) Standard Hard Casters (for carpeted areas)
- (9) Overall Measurements:
 - a. Overall width: 25” - 27”
 - b. Overall depth: 25”– 28”

(10) Must have a minimum of the following adjustments (In addition to the above):

- a. 360 Degree Swivel
- b. Knee-Tilt with Tilt Tension
- c. Back angle
- d. Forward Tilt
- e. Forward Tilt and Upright Tilt Lock

For projects with systems furniture, also provide a written description of the following minimum requirements:

- (1) Type furniture systems (panel, stacking panels, spine wall, desk based system, or a combination)
- (2) Minimum noise reduction coefficient (NRC)
- (3) Minimum sound transfer coefficient (STC)
- (4) Minimum flame spread and smoke development
- (5) UL testing for task lighting and electrical system
- (6) Panel widths and heights and their locations (this may be done on the drawings) Worksurface types and sizes (this may be done on the drawings)
- (7) Worksurface edge type
- (8) Varying panel/cover finish materials and locations (locations may be shown on the drawings)
- (9) Storage requirements
- (10) Keyboard requirements
- (11) Lock and keying requirements
- (12) Accessory components (examples: tack boards, marker boards, paper management)
- (13) Electrical and communication raceway requirement; type, capacity and location (base, beltline, below and/or above beltline)
- (14) Locations of communication cables (base, beltline, below and/or above beltline, top channel)
- (15) Types of electrical outlets
- (16) Types of communication jacks; provided and installed by others
- (17) Locations of electrical outlets and communication jacks (this may be done on the drawings)
- (18) Type of cable (examples: Cat. 5, Cat. 6, fiber optic; UTP or STP, etc.) system needs to support; provided and installed by others

1.1.3. Alternate Manufacturer List

Provide a table consisting of major furniture items that lists the manufacturers products specified on the Order Form and two alternate manufacturers. Major furniture items include, but are not limited to, casegoods, furniture systems, seating, and tables. Organize matrix by item code and item name. Supply alternates that are available on GSA Schedule and meet the requirements of the Furniture Order Form. One of the two alternates must be from UNICOR if possible. Provide manufacturer name address, telephone number, product series and product name for each alternate manufacturer.

1.1.4. FF&E Procurement List

Provide a table that lists all FF&E furniture, mission unique equipment and building Contractor Furnished/Contractor Installed (CF/CI) items. Give each item a code and name and designate whether item will be procured as part of the FF&E furniture, mission unique equipment or the building construction contract. Use the item code to key all FF&E documents including location plans, color boards, data sheets, cost estimate, etc.

1.1.5. Points of Contact (POCs)

Provide a comprehensive list of POCs needed to implement the FF&E package. This would include but not be limited to appropriate project team members, using activity contacts, interior design representatives, construction contractors and installers involved in the project. In addition to name, address, phone, fax and email, include each contact's job function. Divide the FF&E package into different sections based on this listing, applies to order forms and cost estimates.

1.1.6. Color Boards

Provide color boards for all finishes and fabrics for all FF&E items. Finishes to be included but not limited to paint, laminate, wood finish, fabric, etc.

1.1.7. Itemized Furniture Cost Estimate

Provide an itemized cost estimate of furnishings keyed to the plans and specifications of products included in the package. This cost estimate should be based on GSA price schedules. The cost estimate must include separate line items for general contingency, installation, electrical hook-up for systems furniture or other furniture requiring hardwiring by a licensed electrician, freight charges and any other related costs. Installation and freight quotes from vendors should be use in lieu of a percentage allowance when available. Include a written statement that the pricing is based on GSA schedules. An estimate developed by a furniture dealership may be provided as support information for the estimate, but must be separate from the contractor provided estimate.

1.2. INTERIOR DESIGN DOCUMENTS

1.2.1. Overall Furniture and Area Plans

Provide floor Plans showing locations and quantities of all freestanding, and workstation furniture proposed for each floor of the building. Key each room to a large scale Furniture Placement Plan showing the furniture configuration, of all furniture. Provide enlarged area plans with a key plan identifying the area in which the building is located. Key all the items on the drawings by furniture item code. Do not provide manufacturer specific information such as product names and numbers on drawings, Drawings shall be non-proprietary. This is typical for FFE on all plans, including those mentioned below.

1.2.2. Workstation Plans

Show each typical workstation configuration in plan view, elevations or isometric view. Drawings shall illustrate panels and all major components for each typical workstation configuration. Identify workstations using the same numbering system as shown on the project drawings. Key components to a legend on each sheet which identifies and describes the components along with dimensions. Provide the plan, elevations and isometric of each typical workstation together on the same drawing sheet.

1.2.3. Panel Plans

Show panel locations and critical dimensions from finished face of walls, columns, panels including clearances and aisle widths. Key panel assemblies to a legend which shall include width, height, configuration of frames, panel fabric and finishes (if there are different selections existing within a project), powered or non-powered panel and wall mount locations.

1.2.4. Desk Plans

Provide typical free standing desk configurations in plan view, elevation or isometric view and identify components to clearly represent each desk configuration.

1.2.5. Reflected Ceiling Plans

Provide typical plans showing ceiling finishes and heights, lighting fixtures, heating ventilation and air conditioning supply and return, and sprinkler head placement for coordination of furniture.

1.2.6. Electrical and Telecommunication Plans

Show power provisions including type and locations of feeder components, activated outlets and other electrical components. Show locations and quantities of outlets for workstations. Clearly identify different outlets, i.e. electrical, LAN and telecommunication receptacles indicating each type proposed. Show wiring configuration, (circuiting, switching, internal and external connections) and provide as applicable.

1.2.7. Artwork Placement Plans

Provide an Artwork Placement Plan to show location of artwork, assign an artwork item code to each piece of artwork. As an alternative, artwork can be located on the Furniture Plans. Provide a schedule that identifies each piece by room name and number. Provide installation instructions; include mounting height.

1.2.8. Window Drapery Plans

Provide Interior Window Drapery Plans. Key each drapery treatment to a schedule showing color, pattern, material, drapery size and type, draw direction, location and quantities.

1.3. FURNITURE SELECTION

1.3.1. Select furniture from the GSA Schedules. Specify furniture available open market when an item is not available on the GSA Schedules. Provide justification for items not available on the GSA Schedules.

1.3.2. To the greatest extent possible when specifying furniture work within a manufacturer's family of furniture for selections, example: Steelcase, Turnstone, Brayton International, Metro, and Vecta are all Steelcase companies. Each alternate should also be specified from a manufacturer's family of furniture, example: first set of alternates would be specified from Knoll's family of furniture and the second from Herman Miller family of furniture. It may be necessary to make some selections from other than a manufacturer's family of furniture if costs are not reasonable for particular items, some items are not available or appropriate for the facility or the items are not on GSA Schedule. If this occurs, consider specifying product from an open line that is accessible by numerous dealerships. Select office furniture including case goods, tables, storage, seating, etc. that is compatible in style, finish and color. Select furniture that complies with ANSI/BIFMA and from manufacturer's standard product line as shown in the most recent published price list and/or amendment and not custom product.

1.4. CONSTRUCTION

1.4.1. Provide knee space at workstations and tables that is not obstructed by panels/legs that interfere with knee space of seated person and provide desks, storage and tables with leveling devices to compensate for uneven floors.

1.4.2. Provide worksurface tops constructed to prevent warpage. Provide user friendly features such as radius edges. Do not use sharp edges and exposed connections and ensure the underside of desks, tables and worksurfaces are completely and smoothly finished. Provide abutting worksurfaces that mate closely and are of equal heights when used in side-by-side configurations in order to provide a continuous and level worksurface.

1.4.3. Drawers shall stay securely closed when in the closed position and protect wires from damage during drawer operation. Include a safety catch to prevent accidental removal when fully open.

1.4.4. Unless otherwise noted, specify lockable desks and workstations and storage of steel construction. Use tempered glass glazing when glazing is required.

1.5. FINISHES AND UPHOLSTERY

1.5.1. Specify neutral colors for casegoods, furniture systems, storage and tables. Specify desk worksurfaces and table tops that are not too light or too dark in color and have a pattern to help hide soiling. Accent colors are allowed in break and lounge areas. Keep placement of furniture systems panel fabric accent colors to a minimum. All finishes shall be cleanable with ordinary household cleaning solutions.

1.5.2. Use manufacturer's standard fabrics; including textile manufacturers fabrics that have been graded into the furniture manufacturers fabric grades and are available through their GSA Schedule. Customers Own Material

(COM) can be used in headquarter buildings in command suites with executive furniture. Coordinate specific locations with Corps of Engineers Interior Designer.

1.5.3. Specify seating upholstery that meets Wyzenbeek Abrasion Test, 55,000 minimum rubs. Specify a soil retardant finish for woven fabrics if Crypton or vinyl upholstery is not provided for seating in dining areas. Use manufacturer's standard fabrics. This includes textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Specify upholstery and finish colors and patterns that help hide soiling. Specify finishes that can be cleaned with ordinary household cleaning solutions.

1.6. ACCESSORIES

1.6.1. Specify all accessories required for completely finished furniture installation. Provide filing cabinets and storage for office supplies. Provide tack surfaces at workstations with overhead storage. Provide tackable surfaces at workstations with overhead storage.

1.6.2. Not Used.

1.6.3. Workstations are to be equipped with stable keyboard trays that have height adjustability, tilting capability, including negative tilt, have a mouse pad at same height as the keyboard tray that can accommodate both left and right handed users, and retractable under worksurface.

1.7. MISSION UNIQUE EQUIPMENT

Funding for FF&E furniture items and mission unique equipment (MUE) items are from two different sources. Separate the designs and procurement documentation for FFE items and MUE. MUE includes, but is not limited to, items such as industrial shelving, workbenches, appliances, fitness equipment, IT equipment and supporting carts. The User will purchase and install mission unique equipment items, unless otherwise noted. Identify locations of known MUE items such as industrial shelving, workbenches, appliances, etc. for space planning purposes.

1.8. SUSTAINABILITY

1.8.1. For all designs provided regardless of facility type, make every effort to implement all aspects of sustainability to the greatest extent possible for all the selections made in the FF&E package. This includes but is not limited to the selection of products that consider: **Material Chemistry and Safety of Inputs** (What chemicals are used in the construction of the selections?); **Recyclability** (Do the selections contain recycled content?); **Disassembly** (Can the selections be disassembled at the end of their useful life to recycle their materials?).

1.8.2. Make selections to the greatest extent possible of products that possess current McDonough Braungart Design Chemistry ([MBDC](#)) certification or other "third-party" certified Cradle to Cradle program, Forest Stewardship Council (FSC) certification, GREENGAURD certification or similar "third-party" certified products consisting of low-emitting materials.

1.9. FURNITURE SYSTEMS

1.9.1. General.

Where appropriate, design furniture systems in open office areas. Coordinate style and color of furniture systems with other storage, seating, etc. in open office areas. Minimize the number of workstation typicals and the parts and pieces required for the design to assist in future reconfiguration and inventorying.

1.9.2. Connector Systems.

Specify a connector system that allows removal of a single panel or spine wall within a typical workstation configuration without requiring disassembly of the workstation or removal of adjacent panels. Specify connector system with tight connections and continuous visual seals. When Acoustical panels are used, provide connector system with continuous acoustical seals. Specify concealed clips, screws, and other construction elements, where possible.

1.9.3. Panels and Spine Walls

Specify panels and spine walls with hinged or removable covers that permit easy access to the raceway when required but are securely mounted and cannot be accidentally dislodged under normal conditions. Panels shall be capable of structurally supporting more than 1 fully loaded component per panel per side. Raceways are to be an integral part of the panel and must be able to support lay-in cabling and have a large capacity for electrical and IT. Do not thread cables through the frame.

1.9.4. Electrical And Information/Technology (IT)

Design furniture with electrical systems that meets requirements of UL 1286 when powered panels are required and UL approved task lights that meet requirements of NFPA 70. Dependent on user requirements and Section 01 10 00, paragraph 3 requirements, it is recommended that workstation electrical and IT wiring entry come from the building walls to eliminate the use of power poles and access at the floor. Design electrical and IT systems that are easily accessed in the spine wall and panels without having to move return panels and components. Electrical and IT management will be easily accessible by removable wall covers which can be removed while workstation components are still attached. Specify connector system that has continuation of electrical and IT wiring within workstations and workstation to workstation.

1.9.5. Pedestals

Specify pedestals that are interchangeable from left to right, and right to left, and retain pedestal locking system capability.

1.10. EXECUTIVE FURNITURE

1.10.1. Design for executive furniture in command areas, coordinate specific locations with Corps of Engineers Interior Designer. Use upgraded furniture, upholsteries and finishes in command suites. This includes but is not limited to wood casegoods, seating and tables. Select executive furniture casegoods from a single manufacturer and style line, to include workstations, credenzas, filing, and storage, etc.

1.10.2. Specify furniture with wood veneer finish (except worksurfaces) with mitered solid wood edge of same wood type. Provide worksurface plastic laminate that closely matches adjacent wood veneer. Other executive office furniture such as seating, tables, executive conference room furniture, etc. shall be compatible in style, finish and color with executive furniture casegoods.

1.11. SEATING

1.11.1. General

Specify appropriate chair casters and glides for the floor finish where the seating is located. Universal casters that are appropriate for both hard surface flooring and carpet are preferred. All seating shall support up to a minimum of 250 lbs.

1.11.2. Desk and Guest Seating

Select ergonomic desk chairs with casters, non-upholstered adjustable arms, waterfall front, swivel, tilt, variable back lock, adjustable back height or adjustable lumbar support, pneumatic seat height adjustment, and padded, contoured upholstered seat and back. Desk and guest chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Depending on scale of desk chair provide seat pan forward and back adjustment to increase or decrease depth of seat pan. All desk chairs shall have an adjustable seat height range of 4 1/2", range to include 16 1/2"-20". Select guest chairs that are compatible in style, finish and color with the desk chairs.

1.11.3. Conference Room Seating

At tables, select ergonomic conference seating with casters, non-upholstered arms, waterfall front, swivel, tilt, pneumatic seat height adjustment, and padded, contoured seat and back, unless otherwise noted. Select arm height and/or design that allows seating to be moved up closely to the table top. Conference chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Perimeter conference chairs shall be compatible in style, finish and color with conference seating at the tables.

1.11.4. Lounge, Waiting and Reception Area Seating

Select seating with arms and cushioned, upholstered seat and back. In heavy use areas, arms shall be easily cleaned such as non-upholstered arms or upholstered arms with wood arm caps unless otherwise noted.

1.11.5. Break Room Seating

Select stackable seating that is easily cleaned. Seating shall be appropriate for table and counter heights as applicable with non-upholstered arms if arms are required. Chairs shall have metal legs and composite materials for seats.

1.11.6. Lounge, Waiting and Reception Furniture.

Design for end and coffee tables with plastic laminate tops that are compatible in style finish and color with the seating.

1.12. FILING AND STORAGE.

Select storage and shelving units that meet customer's functional load requirements for stored items. Specify counterweights for filing cabinets when required by the manufacturer for stability. File drawers shall allow only one drawer to be opened at a time. Provide heavy duty storage and shelving if information is not available.

1.13. TRAINING TABLES.

Don't use plastic laminate self edge. Training tables shall be reconfigurable, moveable and storable; lighter weight folding with dollies or casters as necessary. Specify dollies if required.

1.14. FURNITURE WARRANTIES.

Specify manufacturer's performance guarantees or warranties that include parts, labor and transportation as follows:

Furniture System, unless otherwise noted – 10 year minimum
Furniture System Task Lights – 2 year minimum, excluding bulbs
Furniture System Fabric – 3 year minimum
Desks - 10 year minimum
Seating, unless otherwise noted - 10 year minimum
Seating Mechanisms and Pneumatic Cylinders - 10 years
Fabric - 3 years minimum
Filing and Storage - 10 year minimum
Tables, unless otherwise noted - 10 year minimum
Table Mechanisms – 5 year
Table Ganging Device - 1 year
Items not listed above - 1 year minimum

ATTACHMENT C

TRACKING COMMENTS IN DRCHECKS

1.0 General

The Government and DB Contractor shall set up the project in Dr Checks. Throughout the design process, the parties shall enter, track, and back-check comments using the DrChecks system. Government reviewers enter design review comments into DrChecks. Designers of Record shall annotate comments timely and specifically to indicate exactly what action will be taken or why the action is not required. Comments considered critical by the conference participants shall be flagged as such.

2.0 DrChecks Review Comments

The Contractor and the Government shall monitor DrChecks to assure all comments are annotated and agreed to by the designers and reviewers prior to the next submittal. The DrChecks comments and responses shall be printed and included in the design analysis for record.

2.1. Conference participants (reviewers) will expect coordination between Design Analysis calculations and the submitted design. Reviewers will also focus on the design submittal's satisfaction of the contract requirements.

2.2. The Designers of Record shall answer each comment in DrChecks with a formal response prior to the next submittal, clearly indicating what action will be taken and what drawing/spec will change. Designers of Record are encouraged to directly contact reviewers to discuss and agree to the formal comment responses rather than relying only on DrChecks and review meetings to discuss comments. With the next design conference, reviewers will back-check answers to the comments against the submittal, in addition to reviewing additional design work.

2.3. Comments that, in the DB Contractor's opinion, require effort outside the scope of the contract shall be clearly indicated as such in DrChecks. The DB Contractor shall not proceed with work outside the contract until a modification to the contract is properly executed, if one is necessary.

3.0 DrChecks Initial Account Set-Up

To initialize an office's use of DrChecks, choose a contact person within the office to call the DrChecks Help Desk at 800-428-HELP, M-F, 8AM-5PM, Central time. This POC will be given an office password to distribute to others in the office. Individuals can then go to the hyperlink at <http://www.projnet.org> and register as a first time user. Upon registration, each user will be given a personal password to the DrChecks system.

3.1. Once the office and individuals are registered, the COE's project manager or lead reviewer will assign the individuals and/or offices to the specific project for review. At this point, persons assigned can make comments, annotate comments, and close comments, depending on their particular assignment.

4.0 DrChecks Reviewer Role

The Contractor is the technical reviewer and the Government is the compliance reviewer of the DB designers design documents. Each reviewer enters their own comments into the Dr Checks system. To enter comments:

4.1. Log into DrChecks.

4.2. Click on the appropriate project.

4.3. Click on the appropriate review conference. An Add comment screen will appear.

4.4. Select or fill out the appropriate sections (particularly comment discipline and type of document for sorting) of the comment form and enter the comment in the space provided.

4.5. Click the Add Comment button. The comment will be added to the database and a fresh screen will appear for the next comment you have.

4.6. Once comments are all entered, exit DrChecks by choosing “My Account” and then Logout.

5.0 DrChecks Comment Evaluation

The role of the designers of record is to evaluate and respond to the comments entered by the Government reviewers and by the DB Contractor. To respond to comments:

5.1. Log into DrChecks.

5.2. Click on the appropriate project.

5.3. Under “Evaluate” click on the number under “Pending”.

5.4. Locate the comments that require your evaluation. (Note: If you know the comment number you can use the Quick Pick window on your home page in DrChecks; enter the number and click on go.)

5.5. Select the appropriate evaluation (concur, non-concur, for information only, or check and resolve) and add the response.

5.6. Click on the Add button. The evaluation will be added to the database and a fresh screen will appear with the next comment.

5.7. Once evaluations are all entered, exit DrChecks by choosing “My Account” and then Logout.

6.0 DrChecks Back-check

At the following design conference, participants will back-check comment annotations against newly presented documents to verify that the designers' responses are acceptable and completed. The Contractor and Government reviewers shall either enter additional back-check comments, as necessary or close those that are resolved as a result of the design conferences:

6.1. Log into DrChecks.

6.2. Click on the appropriate project.

6.3. Under “My Backcheck” click on the number under “Pending”.

6.4. If you agree with the designer's response select “Close Comment” and add a closing response if desired.

6.5. If you do not agree with the designer's response or the submittal does not reflect the response given, select “Issue Open”, enter additional information.

6.6. Click on the Add button. The back-check will be added to the database and a fresh screen will appear with the next comment.

6.7. Once back-checks are all entered, exit DrChecks by choosing “My Account” and then Logout. The design is completed and final when there are no pending comments to be evaluated and there are no pending or open comments under back-check.

ATTACHMENT D
SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

Instructions: Use the information outlined in this document to provide the minimum requirement for development of Fire Protection and Life Safety Code submittals for all building projects. Additional and supplemental information may be used to further develop the code review. Insert N/A after criteria, which may be "not applicable".

1.0 SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

- 1.1. Project Name (insert name and location)
- 1.2. Applicable Codes and Standards
 - 1.2.1. Unified Facilities Criteria (UFC): 3-600-01, Design: Fire Protection Engineering For Facilities
 - 1.2.2. International Building Code (IBC) for fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01.
 - 1.2.3. National Fire Protection Association (NFPA) 101 Life Safety Code (latest edition), for building egress and life safety and applicable criteria in UFC 3-600-01.
 - 1.2.4. ADA and ABA Accessibility Guidelines. For Buildings and Facilities See Section 01 10 00, Paragraph 3 for facility specific criteria.
- 1.3. Occupancy Classification
IBC chapters 3 and 4
- 1.4. Construction Type
IBC chapter 6
- 1.5. Area Limitations
IBC chapter 5, table 503
- 1.6. Allowable Floor Areas
IBC section 503, 505
- 1.7. Allowable area increases
IBC section 506, 507
- 1.8. Maximum Height of Buildings
IBC section 504
- 1.9. Fire-resistive substitution
- 1.10. Occupancy Separations
IBC table 302.3.2
- 1.11. Fire Resistive Requirements
 - 1.11.1. Exterior Walls - [] hour rating, IBC table 601, 602
 - 1.11.2. Interior Bearing walls - [] hour rating
 - 1.11.3. Structural frame - [] hour rating
 - 1.11.4. Permanent partitions - [] hour rating

- 1.11.5. Shaft enclosures - [] hour rating
- 1.11.6. Floors & Floor-Ceilings - [] hour rating
- 1.11.7. Roofs and Roof Ceilings - [] hour rating
- 1.12. Automatic Sprinklers and others used to determine the need for automatic Extinguishing Equipment, Extinguishing Systems, Foam Systems, Standpipe
 - 1.12.1. UFC 3-600-01, chapters 4 and 6 systems, wet chemical systems, etc. State which systems are required and to what criteria they will be designed.
 - 1.12.2. UFC 3-600-01, Appendix B Occupancy Classification. Note the classification for each room. This may be accomplished by classifying the entire building and noting exceptions for rooms that differ (E.g. The entire building is Light Hazard except boiler room and storage rooms which are [], etc.)
 - 1.12.3. UFC 3-600-01, Chapter 3 Sprinkler Design Density, Sprinkler Design Area, Water Demand for Hose Streams (supply pressure and source requirements).
 - 1.12.4. UFC 3-600-01, Chapter 4 Coverage per sprinkler head. Extended coverage sprinkler heads are not permitted.
 - 1.12.5. Available Water Supply. Provide the results of the water flow tests showing the available water supply static pressure and residual pressure at flow. Based on this data and the estimated flow and pressure required for the sprinkler system, determine the need for a fire pump.
 - 1.12.6. NFPA 13, Para. 8.16.4.6.1. Provide backflow preventer valves as required by the local municipality, authority, or water purveyor. Provide a test valve located downstream of the backflow preventer for flow testing the backflow preventer at full system demand flow. Route the discharge to an appropriate location outside the building.
- 1.13. Kitchen Cooking Exhaust Equipment
Describe when kitchen cooking exhaust equipment is provided for the project. Type of extinguishing systems for the equipment should be provided. per NFPA 96. Show all interlocks with manual release switches, fuel shutoff valves, electrical shunt trips, exhaust fans, and building alarms.
- 1.14. Portable Fire Extinguishers, fire classification and travel distance. per NFPA 10
- 1.15. Enclosure Protection and Penetration Requirements. - Opening Protectives and Through Penetrations
 - 1.15.1. IBC Section 712, 715 and Table 715.3. Mechanical rooms, exit stairways, storage rooms, janitor [] hour rating. IBC Table 302.1.1
 - 1.15.2. Fire Blocks, Draft Stops, Through Penetrations and Opening Protectives
- 1.16. Fire Dampers. Describe where fire dampers and smoke dampers are to be used (IBC Section 716 and NFPA 90A). State whether isolation smoke dampers are required at the air handler.
- 1.17. Detection Alarm and Communication. UFC 3-600-01, (Chapter 5); NFPA 101 para. 3.4 (chapters 12-42); NFPA 72
- 1.18. Mass Notification. Describe building/facility mass notification system (UFC 4-021-01) type and type of base-wide mass notification/communication system. State whether the visible notification appliances will be combined with the fire alarm system or kept separate. (Note: Navy has taken position to combine visible notification appliances with fire alarm).
- 1.19. Interior Finishes (classification). NFPA 101.10.2.3 and NFPA 101.7.1.4
- 1.20. Means of Egress

- 1.20.1. Separation of Means of Egress, NFPA 101 chapters 7 and 12-42; NFPA101.7.1.3
- 1.20.2. Occupant Load, NFPA101.7.3.1 and chapters 12-42.
- 1.20.3. Egress Capacity (stairs, corridors, ramps and doors) NFPA101.7.3.3
- 1.20.4. Number of Means of Egress, NFPA101.7.4 and chapters 12-42.
- 1.20.5. Dead end limits and Common Path of Travel, NFPA 101.7.5.1.6 and chapters 12-42.
- 1.20.6. Accessible Means of Egress (for accessible buildings), NFPA101.7.5.4
- 1.20.7. Measurement of Travel Distance to Exits, NFPA101.7.6 and chapters 12-42.
- 1.20.8. Discharge from Exits, NFPA101.7.7.2
- 1.20.9. Illumination of Means of Egress, NFPA101.7.8
- 1.20.10. Emergency Lighting, NFPA101.7.9
- 1.20.11. Marking of Means of Egress, NFPA101.7.10
- 1.21. Elevators, UFC 3-600-01, Chapter 6; IBC and ASME A17.1 - 2000,(Safety Code for Elevators and Escalators)
- 1.22. Accessibility Requirements, ADA and ABA Accessibility Guidelines for Buildings and Facilities
- 1.23. Certification of Fire Protection and Life Safety Code Requirements. (Note: Edit the Fire team membership if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features for this project in accordance with the attached completed form(s).
- 1.24. Designer of Record. Certification of Fire protection and Life Safety Code Requirements. (Note: Edit the Fire team members if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features of this project.

Fire Protection Engineer of Record:

Signature and Stamp

Date

OR

Architect of Record:

Signature and Stamp

Date

Mechanical Engineer of Record:

Signature and Stamp

Date

Electrical Engineer of Record:

Signature/Date

ATTACHMENT E
LEED SUBMITTALS

LEED Credit Paragraph		Contractor Check Here if Credit is Claimed	LEED-NC v3 Submittals (OCT09)		Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use
PAR			FEATURE	DUE AT		REQUIRED DOCUMENTATION	DATE	REV
GENERAL								
			GENERAL - All calculations shall be in accordance with LEED 2009 Reference Guide.					
			GENERAL: Obtain excel version of this spreadsheet at http://en.sas.usace.army.mil/enWeb/EngineeringCriteria .					
			GENERAL - For all credits, narrative/comments may be added to describe special circumstances or considerations regarding the project's credit approach.					
			GENERAL - Include all required LEED drawings indicated below in contract drawings with applicable discipline drawings, labeled For Reference Only.					
			NOTE: Each submittal indicated with "****" differs from LEED certified project submittals by either having a different due date or being an added submittal not required by GBCI.					
			NOTE: Projects seeking LEED certification need only submit to GBCI whatever documentation is acceptable to GBCI (for example, licensed professional certifications). This checklist identifies what must be submitted to the Government for internal review purposes. Government review of LEED documentation in no way supercedes or modifies the requirements and rulings of GBCI for purposes of compliance with project requirement to obtain LEED certification.					
			GENERAL - Audit documentation may include but is not limited to what is indicated in this table.					
				Closeout		List of all Final Design submittals revised after final design to reflect actual closeout conditions. Revised Final Design submittals. - OR - Statement confirming that no changes have been made since final design that effect final design submittal documents.		Proj Engr (PE)
CATEGORY 1 - SUSTAINABLE SITES								
SSPR1			Construction Activity Pollution Prevention (PREREQUISITE)	**Final Design		List of drawings and specifications that address the erosion control, particulate/dust control and sedimentation control measures to be implemented.		CIV
				**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
				**Final Design		Narrative that indicates which compliance path was used (NPDES or Local standards) and describes the measures to be implemented on the project. If a local standard was followed, provide specific information to demonstrate that the local standard is equal to or more stringent than the NPDES program.		CIV
SS1			Site Selection	Final Design		Statement confirming that project does not meet any of the prohibited criteria.		CIV
				**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
				Final Design	X	LEED Site plan drawing that shows all proposed development, line depicting boundary of all bodies of water and/or wetlands within 100 feet of project boundary and a line depicting 5' elevation above 100 year flood line that falls within project boundary. Not required if neither condition applies.		CIV
SS2			Development Density & Community Connectivity	Final Design		Option 1: LEED Site vicinity plan showing project site and surrounding development. Show density boundary or note drawing scale.		CIV
				**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
				Final Design		Option 1: Table indicating, for project site and all surrounding sites within density radius (keyed to site vicinity plan), site area and building area. Project development density calculation. Density radius calculation. Development density calculation within density radius.		CIV
				Final Design		Option 2: LEED Site vicinity plan showing project site, the 1/2 mile community radius, pedestrian walkways and the locations of the residential development(s) and Basic Services surrounding the project site.		CIV
				Final Design		Option 2: List (including business name and type) of all Basic Services facilities within the 1/2 mile radius, keyed to site vicinity plan.		CIV
SS3			Brownfield Redevelopment	Final Design		Narrative describing contamination and the remediation activities included in project. Include statement indicating how site was determined to be a brownfield.		CIV
				**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS4.1			Alternative Transportation: Public Transportation Access	Final Design		Statement indicating which option for compliance applies. State whether public transportation is existing or proposed and, if proposed, cite source of this information.		CIV
				**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
				Final Design		Option 1: LEED Site vicinity plan showing project site, mass transit stops and pedestrian path to them with path distance noted.		CIV
				Final Design		Option 2: LEED Site vicinity plan showing project site, bus stops and pedestrian path to them with path distance noted.		CIV
SS4.2			Alternative Transportation: Bicycle Storage & Changing Rooms	Final Design		FTE calculation. Bicycle storage spaces calculation. Shower/changing facilities calculation.		CIV
				Final Design		List of drawings that show the location(s) of bicycle storage areas. Statement indicating distance from building entrance.		CIV
				Final Design		List of drawings that show the location(s) of shower/changing facilities and, if located outside the building, statement indicating distance from building entrance.		CIV

Friday, June 25, 2022

Friday, June 25, 2010

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v3 Submittals (OCT09)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
SS4.3		Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	Final Design	Statement indicating which option for compliance applies. FTE calculation. Statement indicating total parking capacity of site.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Low-emission & fuel-efficient vehicle calculation.		CIV
			Final Design	Option 1: List of drawings and specification references that show location and number of preferred parking spaces for low-emission & fuel-efficient vehicles and signage.		CIV
			Final Design	Option 1: Statement indicating quantity, make, model and manufacturer of low-emission & fuel-efficient vehicles to be provided. Statement confirming vehicles are zero-emission or indicating ACEEE vehicle scores.		CIV
			Final Design	Option 2: Low-emission & fuel-efficient vehicle parking calculation.		CIV
			Final Design	Option 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Low-emission & fuel-efficient vehicle refueling station calculation.		CIV
			Final Design	Option 3: List of drawings and specifications indicating location and number of refueling stations, fuel type and fueling capacity for each station for an 8-hour period.		CIV
			Closeout	X Option 3: Construction product submittals indicating what was provided and confirming compliance with respect to fuel type and fueling capacity for each station for an 8-hour period.		CIV
SS4.4		Alternative Transportation: Parking Capacity	Final Design	Statement indicating which option for compliance applies.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Preferred parking calculation including number of spaces required, total provided, preferred spaces provided and percentage.		CIV
			Final Design	Option 2: FTE calculation. Preferred parking calculation including number of spaces provided, preferred spaces provided and percentage.		CIV
			Final Design	Options 1 and 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Narrative indicating number of spaces required and provided and describing infrastructure and support programs with description of project features to support them.		CIV
SS5.1		Site Development: Protect or Restore Habitat	**Final Design	Option 1: List of drawing and specification references that convey site disturbance limits.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design	Option 2: LEED site plan drawing that delineates boundaries of each preserved and restored habitat area with area (sf) noted for each.		CIV
			**Final Design	Option 2: Percentage calculation of restored/preserved habitat to total site area. List of drawings and specification references that convey restoration planting requirements.		CIV
SS5.2		Site Development: Maximize Open Space	Final Design	Option 2: LEED site plan drawing delineating boundary of vegetated open space adjacent to building with areas of building footprint and designated open space noted.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS6.1		Stormwater Design: Quantity Control	Final Design	Statement indicating which option for compliance applies.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf) -OR - Narrative describing site conditions, measures and controls to be implemented to prevent excessive stream velocities and erosion.		CIV
			Final Design	Option 2: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf). Indicate percent reduction in each.		CIV
SS6.2		Stormwater Design: Quality Control	Final Design	For non-structural controls, list all BMPs used and, for each, describe the function of the BMP and indicate the percent annual rainfall treated. List all structural controls and, for each, describe the pollutant removal and indicate the percent annual rainfall treated.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.1		Heat Island Effect: Non-Roof	**Final Design	LEED site plan drawing indicating locations and quantities of each paving type, including areas of shaded pavement. Percentage calculation indicating percentage of reflective/shaded/open grid area.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV

Friday, June 25, 2010

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v3 Submittals (OCT09)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
SS7.2		Heat Island Effect: Roof	Final Design	Option 1: Percentage calculation indicating percentage of SRI compliant roof area. List of drawings and specification references that convey SRI requirements and roof slopes.		ARC
			Final Design	Option 1: List of specified roof materials indicating, for each, type, manufacturer, product name and identification if known, SRI value and roof slope.		ARC
			**Closeout	Option 1: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 1: Manufacturer published product data or certification confirming SRI		PE
			Final Design	Option 2: Percentage calculation indicating percentage of vegetated roof area.		ARC
			Final Design	Option 3: Combined reflective and green roof calculation.		ARC
			Final Design	Option 3: List of specified roof materials indicating, for each, type, manufacturer, product name and identification if known, SRI value and roof slope.		ARC
			**Closeout	Option 3: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 3: Manufacturer published product data or certification confirming SRI		PE
SS8		Light Pollution Reduction	Final Design	Interior Lighting: List of drawings and specification references that convey interior lighting requirements (location and type of all installed interior lighting, location of non-opaque exterior envelope surfaces, allowing confirmation that maximum candela value from interior fixtures does not intersect non-opaque building envelope surfaces). - OR - List of drawings and specification references that show automatic lighting controls compliance with credit requirement.		ELEC
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		ELEC
			Final Design	Exterior Lighting: List of drawings and specification references that convey exterior lighting requirements (location and type of all site lighting and building façade/landscape lighting).		ELEC
			Final Design	Exterior Site Lighting Power Density (LPD): Tabulation for exterior site lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all site lighting.		ELEC
			Final Design	Exterior Building Facade/Landscape Lighting Power Density (LPD): Tabulation for exterior building facade/landscape lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all building facade/landscape lighting.		ELEC
			Final Design	Exterior Lighting IESNA Zone: Indicate which IESNA zone is applicable to the project.		ELEC
			Final Design	Exterior Lighting Site Lumen table indicating, for each fixture type, quantity installed, initial lamp lumens per luminaire, initial lamp lumens above 90 degrees from Nadir, total lamp lumens and total lamp lumens above 90 degrees. Percentage of site lamp lumens above 90 degrees from nadir to total lamp lumens.		ELEC
			Final Design	Exterior Lighting Narrative describing analysis used for addressing requirements for light trespass at site boundary and beyond.		ELEC
CATEGORY 2 – WATER EFFICIENCY						
WEPR1		Water Use Reduction: 20% Reduction	Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC

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			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Closeout	X Manufacturer published product data or certification confirming fixture water usage.		PE
WE1.1		Water Efficient Landscaping: Reduce by 50%	Final Design	Statement indicating which option for compliance applies.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Calculation indicating, for baseline and design case, total water applied, total potable water applied, total non-potable water applied. Design case percent potable water reduction. If nonpotable water is used, indicate source of nonpotable water.		CIV
			Final Design	List of landscape plan drawings.		CIV
			Final Design	Narrative describing landscaping and irrigation design strategies, including water use calculation methodology used to determine savings and, if non-potable water is used, specific information about source and available quantity.		CIV
WE1.2		Water Efficient Landscaping: No Potable Water Use or No Irrigation	Same as WE1.1	Same as WE1.1		CIV
WE2		Innovative Wastewater Technologies	Final Design	Statement confirming which option for compliance applies.		MEC
			Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Final Design	Option 1: If onsite non-potable water is used, identify source(s), indicate annual quantity from each source and indicate total annual quantity from all onsite non-potable water sources.		MEC
			Final Design	Option 1: Summary calculation indicating baseline annual water consumption, design case annual water consumption, non-potable annual water consumption and total percentage annual water savings.		MEC
			Final Design	Option 2: Statement confirming on-site treatment of all generated wastewater to tertiary standards and all treated wastewater is either infiltrated or used on-site.		MEC
			Final Design	Option 2: List of drawing and specification references that convey design of on-site wastewater treatment features.		CIV
			Final Design	Option 2: On-site water treatment quantity calculation indicating all on-site wastewater source(s), annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from each source and totals for annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from all sources.		CIV
			Final Design	Option 2: Wastewater summary calculation indicating design case annual flush fixture water usage, annual on-site water treatment and percentage sewage conveyance reduction.		MEC
			Final Design	Narrative describing project strategy for reduction of potable water use for sewage conveyance, including specific information on reclaimed water usage and treated wastewater usage.		MEC
WE3		Water Use Reduction: 30% - 40% Reduction	Same as WEPR1	Same as WEPR1		MEC

CATEGORY 3 – ENERGY AND ATMOSPHERE

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EAPR1		Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	**Final Design	**Owner's Project Requirements document		ALL
			**Final Design	**Basis of Design document for commissioned systems		MEC, ELEC
			**Final Design	**Commissioning Plan		MEC, ELEC
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	Commissioning Report		PE
EAPR2		Minimum Energy Performance (PREREQUISITE)	Final Design	Statement listing the mandatory provisions of ASHRAE 90.1 that project meets relative to compliance with this prerequisite and indicating which compliance path was used.		MEC ELEC ARC
			Final Design	Statement indicating which compliance path option applies.		MEC
			Final Design	Option 1: Statement confirming simulation software capabilities and confirming assumptions and methodology.		MEC
			Final Design	Option 1: General information including simulation program, principal heating source, percent new construction and renovation, weather file, climate zone and Energy Star Target Finder score.		MEC
			Final Design	Option 1: Space summary listing, for each building use, the conditioned area, unconditioned area and total area and include total area for each category		MEC
			Final Design	Option 1: List of all simulation output advisory message data and show difference between baseline and proposed design		MEC
			Final Design	Option 1: Comparison summary for energy model inputs including description of baseline and design case energy model inputs, showing both by element type		MEC
			Final Design	Option 1: Energy type summary listing, for each energy type, utility rate description, units of energy and units of demand		MEC
			Final Design	Option 1: Statement indicating whether project uses on-site renewable energy. If yes, list all sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, statement describing how exceptional calculation measure cost savings is determined		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, for each exceptional calculation method indicate energy types and, for each energy type, annual energy savings, annual cost savings, and brief descriptive narrative		MEC
			Final Design	Option 1: Baseline performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand for all four orientations. For each orientation indicate total annual energy use for each orientation and total annual process energy use.		MEC
			Final Design	Option 1: Baseline energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Proposed Design performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand, baseline annual and peak energy demand and percent savings. Indicate total annual energy use and total annual process energy use for both proposed design and baseline and percent savings.		MEC
			Final Design	Option 1: Proposed Design energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Energy cost and consumption by energy type report indicating, for each energy type, proposed design and baseline annual use and annual cost, percent savings annual use and annual cost. Indicate for renewable energy annual energy generated and annual cost. Indicate exceptional calculations annual energy savings and annual cost savings. Indicate building total annual energy use, annual energy cost for proposed design and baseline and indicate percent savings annual energy use and annual energy cost.		MEC

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			Final Design	Option 1: Compliance summaries from energy simulation software. If software does not produce compliance summaries provide output summaries and example input summaries for baseline and proposed design supporting data in the tables. Output summaries must include simulated energy consumption by end use and total energy use and cost by energy type. Example input summaries should represent most common systems and must include occupancy, use pattern, assumed envelope component sizes and descriptive features and assumed mechanical equipment types and descriptive features		MEC
			Final Design	Option 1: Energy rate tariff from project energy providers (only if not using LEED Reference Guide default rates)		MEC
EAPR3		Fundamental Refrigerant Management (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies.		MEC
			Final Design	Option 2: Narrative describing phase out plan, including specific information on phase out dates and refrigerant quantities.		MEC
EA1		Optimize Energy Performance	Final Design	Statement indicating which compliance path option applies.		MEC
			Final Design	Option 1: Statement confirming simulation software capabilities and confirming assumptions and methodology.		MEC
			Final Design	Option 1: General information including simulation program, principal heating source, percent new construction and renovation, weather file, climate zone and Energy Star Target Finder score.		MEC
			Final Design	Option 1: Space summary listing, for each building use, the conditioned area, unconditioned area and total area and include total area for each category		MEC
			Final Design	Option 1: List of all simulation output advisory message data and show difference between baseline and proposed design		MEC
			Final Design	Option 1: Comparison summary for energy model inputs including description of baseline and design case energy model inputs, showing both by element type		MEC
			Final Design	Option 1: Energy type summary listing, for each energy type, utility rate description, units of energy and units of demand		MEC
			Final Design	Option 1: Statement indicating whether project uses on-site renewable energy. If yes, list all sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, statement describing how exceptional calculation measure cost savings is determined		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, for each exceptional calculation method indicate energy types and, for each energy type, annual energy savings, annual cost savings, and brief descriptive narrative		MEC
			Final Design	Option 1: Baseline performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand for all four orientations. For each orientation indicate total annual energy use for each orientation and total annual process energy use.		MEC
			Final Design	Option 1: Baseline energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Proposed Design performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand, baseline annual and peak energy demand and percent savings. Indicate total annual energy use and total annual process energy use for both proposed design and baseline and percent savings.		MEC
			Final Design	Option 1: Proposed Design energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Energy cost and consumption by energy type report indicating, for each energy type, proposed design and baseline annual use and annual cost, percent savings annual use and annual cost. Indicate for renewable energy annual energy generated and annual cost. Indicate exceptional calculations annual energy savings and annual cost savings. Indicate building total annual energy use, annual energy cost for proposed design and baseline and indicate percent savings annual energy use and annual energy cost.		MEC

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			Final Design	Option 1: Compliance summaries from energy simulation software. If software does not produce compliance summaries provide output summaries and example input summaries for baseline and proposed design supporting data in the tables. Output summaries must include simulated energy consumption by end use and total energy use and cost by energy type. Example input summaries should represent most common systems and must include occupancy, use pattern, assumed envelope component sizes and descriptive features and assumed mechanical equipment types and descriptive features	MEC
			Final Design	Option 1: Energy rate tariff from project energy providers (only if not using LEED Reference Guide default rates)	MEC
EA2.1		On-Site Renewable Energy	Final Design	Statement indicating which compliance path option applies.	ELEC
			Final Design	List all on-site renewable energy sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost. Indicate total annual energy use (all sources), total annual energy cost (all sources) and percent renewable energy cost.	ELEC MEC
			Final Design	Option 1: Indicate, for renewable energy, proposed design total annual energy generated and annual cost.	ELEC MEC
			Final Design	Option 2: Indicate CBECS building type and building gross area. Provide the following CBECS data: median annual electrical intensity, median annual non-electrical fuel intensity, average electric energy cost, average non-electric fuel cost, annual electric energy use and cost, annual non-electric fuel use and cost.	ELEC MEC
			Final Design	Option 2: Narrative describing renewable systems and explaining calculation method used to estimate annual energy generated, including factors influencing performance.	ELEC MEC
EA2.2		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1	ELEC MEC
EA2.3		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1	ELEC MEC
EA3		Enhanced Commissioning	**Final Design	**Owner's Project Requirements document (OPR)	ALL
			**Final Design	**Basis of Design document for commissioned systems (BOD)	ELEC MEC
			**Final Design	**Commissioning Plan	ELEC MEC
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.	PE
			Closeout	**Commissioning Report	PE
			**Final Design	Statement by CxA confirming Commissioning Design Review	
			Closeout	Statement by CxA confirming review of Contractor submittals for compliance with OPR and BOD	PE
			Closeout	**Systems Manual	PE
			Closeout	Statement by CxA confirming completion of O&M staff and occupant training	PE
			Closeout	**Scope of work for post-occupancy review of building operation, including plan for resolution of outstanding issues	PE
			**Predesign	Statement confirming CxA qualifications and contractual relationships relative to work on this project, demonstrating that CxA is an independent third party.	MEC
EA4		Enhanced Refrigerant Management	Final Design	Refrigerant impact calculation table with all building data and calculation values as shown in LEED 2009 Reference Guide Example Calculations	MEC
			Final Design	Narrative describing any special circumstances or explanatory remarks	
			Closeout	X Cut sheets highlighting refrigerant data for all HVAC components.	PE
EA5		Measurement & Verification	Closeout	Statement indicating which compliance path option applies.	PE
			Closeout	Measurement and Verification Plan including Corrective Action Plan	PE
			Closeout	**Scope of work for post-occupancy implementation of M&V plan including corrective action plan.	PE
EA6		Green Power	Closeout	Statement indicating which compliance path option applies.	PE
			Closeout	Option 1: Indicate proposed design total annual electric energy usage	PE
			Closeout	Option 2: Indicate actual total annual electric energy usage	PE
			Closeout	Option 3: Calculation indicating building type, total gross area, median electrical intensity and annual electric energy use	PE

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			Closeout	Green power provider summary table indicating, for each purchase type, provider name, annual quantity green power purchased and contract term. Indicate total annual green power use and indicate percent green power		PE
			Closeout	Narrative describing how Green Power or Green Tags are purchased		PE
CATEGORY 4 – MATERIALS AND RESOURCES						
MRPR1		Storage & Collection of Recyclables (PREREQUISITE)	Final Design	Statement confirming that recycling area will accommodate recycling of plastic, metal, paper, cardboard and glass. Narrative indicating any other materials addressed and coordination with pickup.		ARC
MR1.1		Building Reuse: Maintain 55% of Existing Walls, Floors & Roof	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building structural/envelope element, the existing area and reused area. Total percent reused.		ARC
MR1.2		Building Reuse: Maintain 75% of Existing Walls, Floors & Roof	Same as MR1.1	Same as MR1.1		ARC
MR1.3		Building Reuse: Maintain 95% of Existing Walls, Floors & Roof	Same as MR1.1	Same as MR1.1		ARC
MR1.4		Building Reuse: Maintain 50% of Interior Non-Structural Elements	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building interior non-structural element, the existing area and reused area. Total percent reused.		ARC
MR2.1		Construction Waste Management: Divert 50% From Disposal	**Preconstruction	Waste Management Plan		PE
			**Construction Quarterly and Closeout	Spreadsheet calculations indicating material description, disposal/diversion location (or recycling hauler), weight, total waste generated, total waste diverted, diversion percentage		PE
			**Construction Quarterly and Closeout	Receipts/tickets for all items on spreadsheet		PE
MR2.2		Construction Waste Management: Divert 75% From Disposal	Same as MR2.1	Same as MR2.1		PE
MR3.1		Materials Reuse: 5%	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each reused/salvaged material, material description, source or vendor, cost. Total reused/salvaged materials percentage.		PE
MR3.2		Materials Reuse: 10%	Same as MR3.1	Same as MR3.1		PE
MR4.1		Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each recycled content material, material name/description, manufacturer, cost, post-consumer recycled content percent, pre-consumer recycled content percent, source of recycled content data. Total post-consumer content materials cost, total pre-consumer content materials cost, total combined recycled content materials cost, recycled content materials percentage.		PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal.		PE
			Closeout	Manufacturer published product data or certification, confirming recycled content percentages in spreadsheet		PE
MR4.2		Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Same as MR4.1	Same as MR4.1		PE
MR5.1		Regional Materials: 10% Extracted, Processed & Manufactured Regionally	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each regional material, material name/description, manufacturer, cost, percent compliant, harvest distance, manufacture distance, source of manufacture and harvest location data. Total regional materials cost, regional materials percentage.		PE
			Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal.		PE
			Closeout	Manufacturer published product data or certification confirming regional material percentages in spreadsheet		PE

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MR5.2		Regional Materials:20% Extracted, Processed & Manufactured Regionally	Same as MR5.1		Same as MR5.1		PE	
MR6		Rapidly Renewable Materials	Closeout		Statement indicating total materials value and whether default or actual.		PE	
			Closeout		Spreadsheet calculations indicating, for each rapidly renewable material, material name/description, manufacturer, cost, rapidly renewable content percent, rapidly renewable product value. Total rapidly renewable product value, rapidly renewable materials percentage.		PE	
			Final Design		**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal.		ARC	
			Closeout	X	Manufacturer published product data or certification confirming rapidly renewable material percentages in spreadsheet		PE	
MR7		Certified Wood	Closeout		Statement indicating total materials value and whether default or actual.		PE	
			Closeout		Spreadsheet calculations indicating, for each certified wood material, material name/description, vendor, cost, wood component percent, certified wood percent of wood component, FSC chain of custody certificate number. Total certified wood product value, certified wood materials percentage.		PE	
			Final Design or NLT Preconstruction		**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal.		PE	
			Closeout	X	Vendor invoices, FSC chain of custody certificates and anufacturer published product data or certification confirming all certified wood materials percentages in spreadsheet.		PE	
INDOOR ENVIRONMENTAL QUALITY								
EQPR1		Minimum IAQ Performance (PREREQUISITE)	Final Design		Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.		MEC	
			Final Design		Narrative describing the project's ventilation design, including specifics about fresh air intake volumes and special considerations.		MEC	
EQPR2		Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Final Design		Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.		ARC	
			Final Design		List of drawing and specification references that convey conformance to applicable requirements (signage, exhaust system, room separation details, etc).		ARC	
EQ1		Outdoor Air Delivery Monitoring	Final Design		Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.		MEC	
			Final Design		List of drawing and specification references that convey conformance to applicable requirements.		MEC	
			Final Design		Narrative describing the project's ventilation design and CO2 monitoring system, including specifics about monitors, operational parameters and setpoints.		MEC	
			Closeout	X	Cut sheets for CO2 monitoring system.		PE	
EQ2		Increased Ventilation	Final Design		Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.		MEC	
			Final Design		Narrative describing the project's ventilation design, including specifics about zone fresh air intake volumes and demonstrating compliance.		MEC	
			Final Design		Option 2: Narrative describing design method used for determining natural ventilation design, including calculation methodology/model results and demonstrating compliance.		MEC	
			Final Design		List of drawing and specification references that convey conformance to applicable requirements.		MEC	
EQ3.1		Construction IAQ Management Plan: During Construction	**Preconstruction		Construction IAQ Management Plan		PE	
			Closeout		Statement confirming whether air handling units were operated during construction		PE	
			Closeout		Dated jobsite photos showing examples of IAQ management plan practices being implemented. Label photos to indicate which practice they demonstrate. Minimum one photo of each practice at each building.		PE	

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			Closeout	Spreadsheet indicating, for each filter installed during construction, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy.		PE
EQ3.2		Construction IAQ Management Plan: Before Occupancy	**Preconstruction	Construction IAQ Management Plan		PE
			Closeout	Statement indicating which option for compliance applies and confirming that required activities have occurred that meet the applicable requirements.		PE
			Closeout	Option 1a: Narrative describing the project's flushout process, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 1b: Narrative describing the project's pre-occupancy and post-occupancy flushout processes, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 2: Narrative describing the project's IAQ testing process, including specifics about contaminants tested for, locations, remaining work at time of test, retest parameters and special considerations (if any).		PE
			Closeout	Option 2: IAQ testing report demonstrating compliance.		PE
EQ4.1		Low Emitting Materials: Adhesives & Sealants	Closeout	Spreadsheet indicating, for each applicable indoor adhesive, sealant and sealant primer used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor aerosol adhesive, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor aerosol adhesives were used for the project.		PE
			Closeout	Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.2		Low Emitting Materials: Paints & Coatings	Closeout	Spreadsheet indicating, for each applicable indoor paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor anti-corrosive/anti-rust paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor anti-corrosive/anti-rust paints were used for the project.		PE
			Closeout	Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.3		Low Emitting Materials: Flooring Systems	Closeout	Spreadsheet indicating, for each indoor flooring system used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data.		PE
			Closeout	Spreadsheet indicating, for each indoor carpet cushion used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data - OR - Statement confirming no indoor carpet cushion was used for the project.		PE
			Closeout	Manufacturer published product data or certification confirming material compliance label in spreadsheet		PE
EQ4.4		Low Emitting Materials: Composite Wood & Agrifiber Products	Closeout	Spreadsheet indicating, for each indoor composite wood and agrifiber product used, the manufacturer, product name/model number, if it contains added urea formaldehyde (yes/no) and source of LEED compliance data.		PE
			Closeout	Manufacturer published product data or certification confirming material urea formaldehyde in spreadsheet		PE
EQ5		Indoor Chemical & Pollutant Source Control	Closeout	Spreadsheet indicating, for each permanent entryway system used, the manufacturer, product name/model number and description of system.		PE
			Final Design	List of drawing and specification references that convey locations and installation methods for entryway systems.		ARC
			Final Design	Spreadsheet indicating, for each chemical use area, the room number, room name, description of room separation features (walls, floor/ceilings, openings) and pressure differential from surrounding spaces with doors closed - OR - Statement confirming that project includes no chemical use areas and that no hazardous cleaning materials are needed for building maintenance.		ARC MEC
			Final Design	If project includes chemical use areas: List of drawing and specification references that convey locations of chemical use areas, room separation features and exhaust system.		ARC

Friday, June 25, 2010

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v3 Submittals (OCT09)	Provide for Credit Audit Only	Date Submitted (to be filled in by Contractor)	Government Reviewer's Use
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE REV
			Final Design	If project includes places where water and chemical concentrate mixing occurs: List of drawing and specification references that convey provisions for containment of hazardous liquid wastes OR - Statement confirming that project includes no places where water and chemical concentrate mixing occurs.	ARC MEC
			Closeout	If project includes chemical use areas: Spreadsheet indicating, for AHUs/mechanical ventilation equipment serving occupied areas, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy (yes/no) - OR - Statement confirming that project does not use mechanical equipment for ventilation of occupied areas.	PE
EQ6.1		Controllability of Systems: Lighting	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual lighting controls and the percentage of workstations with individual lighting controls.	ELEC
			Final Design	For each shared multi-occupant space, provide a brief description of lighting controls.	ELEC
			Final Design	Narrative describing lighting control strategy, including type and location of individual controls and type and location of controls in shared multi-occupant spaces.	ELEC
EQ6.2		Controllability of Systems: Thermal Comfort	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual thermal comfort controls and the percentage of workstations with individual thermal comfort controls.	MEC
			Final Design	For each shared multi-occupant space, provide a brief description of thermal comfort controls.	MEC
			Final Design	Narrative describing thermal comfort control strategy, including type and location of individual and shared multi-occupant controls.	MEC
EQ7.1		Thermal Comfort: Design	Final Design	Design criteria spreadsheet indicating, for spring, summer, fall and winter, maximum indoor space design temperature, minimum indoor space design temperature and maximum indoor space design humidity.	MEC
			Final Design	Narrative describing method used to establish thermal comfort control conditions and how systems design addresses the design criteria, including compliance with the referenced standard.	MEC
EQ7.2		Thermal Comfort: Verification	Final Design	Narrative describing the scope of work for the thermal comfort survey, including corrective action plan development	MEC
			Final Design	List of drawing and specification references that convey permanent monitoring system.	MEC
EQ8.1		Daylight & Views: Daylight 75% of Spaces	Final Design	Option 2: Table indicating all regularly occupied spaces with space area and space area with compliant daylight zone. Sum of regularly occupied areas and regularly occupied areas with compliant daylight zone. Percentage calculation of areas with compliant daylight zone to total regularly occupied areas.	ARC
			Final Design	Option 1: Simulation model method, software and output data	ELEC
			Final Design	Option 1: Table indicating all regularly occupied spaces with space area, space area with minimum 25 footcandles daylighting illumination, and method of providing glare control. Sum of regularly occupied areas and regularly occupied areas with 25 fc daylighting. Percentage calculation of areas with 25 fc daylighting to total regularly occupied areas.	ELEC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.	ARC
			Final Design	List of drawing and specification references that convey exterior glazed opening head and sill heights, glazing performance properties and glare control/sunlight redirection devices.	ARC
			Closeout	Manufacturer published product data or certification confirming glazing Tvis in spreadsheet	PE
EQ8.2		Daylight & Views: Views for 90% of Spaces	Final Design	Table indicating all regularly occupied spaces with space area and space area with access to views. Sum of regularly occupied areas and regularly occupied areas with access to views. Percentage calculation of areas with views to total regularly occupied areas.	ARC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.	ARC
			Final Design	LEED Floor plan drawings showing line of sight diagramming of views areas in each regularly occupied space. List of drawing/specification references that convey exterior glazed opening head and sill heights.	ARC

INNOVATION & DESIGN PROCESS

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v3 Submittals (OCT09)		Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use
PAR		FEATURE	DUE AT		REQUIRED DOCUMENTATION	DATE	REV
IDc1.1		Innovation in Design	Final Design		Narrative describing intent, requirement for credit, project approach to the credit. List of drawings and specification references that convey implementation of credit. All other documentation that validates claimed credit.		
IDc1.2		Innovation in Design	Final Design				
IDc1.3		Innovation in Design	Final Design				
IDc1.4		Innovation in Design	Final Design				
IDc2		LEED Accredited Professional	Final Design		Narrative indicating name of LEED AP, company name of LEED AP, description of LEED AP's role and responsibilities in the project.		ARC

ATTACHMENT F
Version 02-03-2010

BUILDING INFORMATION MODELING REQUIREMENTS

1.0 Section 1 - Submittal Format

1.1. Design Deliverables. Develop all designs using Building Information Modeling (BIM) and Computer Aided Design (CAD) software. Design submittal drawings shall be Half-Size size, suitable for half-size scaled reproduction.

2.0 Section 2 – Design Requirements

2.1. BIM Model and Facility Data. Contractor shall use BIM application(s) and software(s) to develop project designs. "Facility Data" is defined as associated intelligent attribute data. The "Model" is defined as 3D graphics that includes Facility Data and output as described in the paragraph 'Output' below. Contractors will use the Model to produce accurate Construction Documents. For each Center of Standardization (CoS) facility type included in this project, all BIM Models and associated Facility Data shall be submitted in Bentley Systems BIM XM Workspace 07Q3 with associated USACE Bentley BIM Workspace (which includes specific standard BIM libraries and definitions). This Workspace can be downloaded from the CAD/BIM Technology Center. [Where available, the workspace will be specific to this CoS Facility Standard Design. The Contractor will be provided a baseline multi-discipline BIM Project Model for the CoS Facility Standard Design type, where such a model exists (for the purposes of site adaptation).] The USACE Bentley BIM Workspace is dependent on specific versions of the Bentley BIM suite of products and only the versions of the software that are listed in the Contractor instructions included with the USACE BIM Workspace are permitted to be used.

2.1.1. Reference. Refer to ERDC TR-06-10, "U.S. Army Corps of Engineers Building Information Modeling Road Map" from the CAD/BIM Technology Center website for more information on the USACE BIM implementation goals.

2.2. Drawings. Deliver CAD files used for the creation of the Construction Documents Drawings per requirements in Section 01 33 16, the criteria of the USACE Kansas City District District, and as noted herein. Specification of a CAD file format for these Drawings does not limit which BIM application(s) or software(s) may be used for project development and execution.

2.2.1. IFC Support. The Contractor's selected BIM application(s) and software(s) must support the IFC (Industry Foundation Class - see www.iai-tech.org). Submit any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment for Government approval.

2.2.2. Submittal Requirements. BIM submittals shall be fully interoperable, compatible, and editable with the Bentley BIM tools. Use the specified version of the USACE Bentley BIM Workspace and conform to the requirements of **Sections 3 and 4 below**.

2.2.3. BIM Project Execution Plan.

2.2.3.1. Develop a BIM Project Execution Plan ("Plan" or "PxP") documenting the BIM and analysis technologies selected for the Project Model (integrated with the AEC CAD Standard) from concept development through As-Builts as a design, production, coordination, construction, and documentation tool and the collaborative process by which it shall be executed. See Section 7 for additional guidance on developing the Plan.

2.2.4. BIM Requirements..

2.2.4.1. Facility Data. Develop the Facility Data consisting of a set of intelligent elements for the Model (e.g., doors, air handlers, electrical panels). This Facility Data shall include all material definitions and attributes that are necessary for the Project facility design and construction. Additional data in support of Section 6 Contractor Electives is encouraged.

2.2.4.2. Model Content. The Model and Facility Data shall include, at a minimum, the requirements of Section 4 below.

2.2.4.3. Model Granularity. Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a quarter inch (1/4" = 1'0") scaled drawing (e.g. at least 1/16th, 1/8th and 1/4th), or appropriately scaled civil drawings.

2.2.4.4. Output. Submitted CAD drawings (e.g., plans, elevations, sections, schedules, details, etc.) shall be derived (commonly known as extractions, views or sheets) and maintained from the submitted Model and Facility Data.

2.3. Quality Control. Implement quality control (QC) parameters for the Model, including:

2.3.1. Model Standards Checks. QC validation used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements. Report non-compliant elements and corrective action plan to correct non-compliant elements. Provide the government with detailed justification and request government approval for any non-compliant element which the contractor proposes to be allowed to remain in the Model.

2.3.2. CAD Standards Checks. QC checking performed to ensure that the fonts, dimensions, line styles, levels and other construction document formatting issues are followed per the A/E/C CADD Standard.

2.3.3. Other Parameters. Develop such other QC parameters as Contractor deems appropriate for the Project and provide to the Government for concurrence.

2.4. Design and Construction Reviews. Perform design and construction reviews at each submittal stage under Section 3 to test the Model, including:

2.4.1. Visual Checks. Checking to ensure the design intent has been followed and that there are no unintended elements in the Model.

2.4.2. Interference Management Checks. Locate conflicting spatial data in the Model where two elements are occupying the same space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location) and soft interferences, (e.g., conflicts regarding equipment clearance, service access, fireproofing, insulation) in a written report and resolve.

2.4.3. IFC Coordination View. Provide an IFC Coordination View in IFC Express format for all deliverables. Provide exported property set data for all IFC supported named building elements.

2.4.4. Other Parameters. Develop such other Review parameters as the Contractor deems appropriate for the Project and provide to the Government for concurrence..

3.0 Section 3 – Design Stage Submittal Requirements

3.1. General Submittal Requirements.

3.1.1. Provide submittals in compliance with BIM Project Execution Plan deliverables at stages as described hereinafter.

3.1.2. At each Stage in Paragraphs 3.3 through 3.6, provide a Contractor-certified written report confirming that consistency checks as identified in Paragraphs 2.3 and 2.4 have been completed. This report shall be discussed as part of the review process and shall address cross-discipline interferences, if any.

3.1.3. At each Stage in Paragraphs 3.3 through 3.6, provide the Government with:

- The Model, Facility Data, Workspace and CAD Data files in native Bentley BIM/CAD.

- A 3-D interactive review format of the Model in Bentley Navigator, Autodesk Navisworks, Adobe 3D PDF 7.0 (or later), Google Earth KMZ or other format per Plan requirements. The file format for reviews can change between submittals.

- A list of all submitted files. The list should include a description, directory, and file name for each file submitted. For all CAD sheets, include the sheet title and sheet number. Identify files that have been produced from the submitted Model and Facility Data.

3.2. Initial Design Conference Submittal.

3.2.1. Submit a digital copy of the Plan where, in addition to Paragraph 3.1.4, the USACE Geographic District BIM Manager will coordinate with the USACE CoS BIM Manager to confirm acceptability of the Plan or advise as to additional processes or activities necessary to be incorporated.

3.2.2. Within thirty (30) days after the approval of the Plan, conduct a demonstration to review the Plan for clarification, and to verify the functionality of Model technology workflow and processes. If modifications are required, the Contractor shall complete the modifications and resubmit the Plan and perform subsequent demonstration for Government acceptance. There will be no payment for design or construction until the Plan is acceptable to the Government. The Government may also withhold payment for design and construction for unacceptable performance in executing the approved Plan.

3.3. Interim Design Submittals.

3.3.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4 as applicable to the Interim Design package(s).

3.4. Final Design Submissions and Design Complete Submittals.

3.4.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4. Acceptance according to Paragraph 3.1.4 is required before commencement of construction, as described in Paragraph 3.7.6 of Section 01 33 16.

3.5. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model, including interference management and design change tracking information.

3.6. Final As-Built BIM and CAD Data Submittal. Submit the final Model, Facility Data, and CAD files reflecting as-built conditions for Government Approval, as specified in Section 01 78 02.00 10, PROJECT CLOSEOUT.

4.0 **Section 4 – BIM Model Minimum Requirements and Output**

4.1. General Provisions. The deliverable Model shall be developed to include the systems described below as they would be built and the processes of installing them, and to reflect final as-built conditions. The deliverable model at the interim design stage and at the final design stage (“released for construction”) shall be developed to include as many of the systems described below as are necessary and appropriate at that design stage.

4.2. Architectural/Interior Design. The Architectural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

4.2.1. Spaces. The Model shall include spaces defining accurate net square footage and net volume, and holding data for the room finish schedule for including room names and numbers. Include Programmatic Information provided by the Government or validated program to verify design space against programmed space, using this information to validate area quantities.

4.2.2. Walls and Curtain Walls. Each wall shall be depicted to the exact height, length, width and ratings (thermal, acoustic, fire) to properly reflect wall types. The Model shall include all walls, both interior and exterior, and the necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.2.3. Doors, Windows and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.

4.2.4. Roof. The Model shall include the roof configuration, drainage system, penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.

4.2.5. Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.

4.2.6. Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.

4.2.7. Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.8. Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.9. Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.

4.2.10. Schedules. Provide door, window, hardware sets using BHMA designations, flooring, wall finish, and signage schedules from the Model, indicating the type, materials and finishes used in the design.

4.3. Furniture. The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing, and have necessary intelligence to produce accurate plans. Representation of furniture elements is to be 2D. Contractor may provide a minimal number of 3D representations as examples. Examples of furniture include, but are not limited to, desks, furniture systems, seating, tables, and office storage.

4.3.1. Furniture Coordination. Furniture that makes use of electrical, data or other features shall include the necessary intelligence to produce coordinated documents and data.

4.4. Equipment. The Model may vary in level of detail for individual elements within a Model. Equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans and minimum schedules depicting their configuration. Examples of equipment include but are not limited to copiers, printers, refrigerators, ice machines and microwaves.

4.4.1. Schedules. Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.

4.5. Structural. The structural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.5.1. Foundations. All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations

4.5.2. Floor Slabs. Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.

4.5.3. Structural Steel. All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.

4.5.4. Cast-in-Place Concrete. All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.

4.5.5. Expansion/Contraction Joints. Joints shall be accurately depicted.

4.5.6. Stairs. The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.

4.5.7. Shafts and Pits. The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.

4.6. Mechanical. The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2" NPS) field-routed piping is not required in the model. Additional minimum Model requirements include:

4.6.1. HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules.

4.6.1.1. Mechanical Piping. All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules.

4.6.2. Plumbing. All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules.

4.6.3. Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.

4.6.4. Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.7. Electrical/Telecommunications. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2"Ø) field-routed conduit is not required in the model. Additional minimum Model requirements include:

4.7.1. Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panelboards, cable trays and control systems), including necessary intelligence to produce accurate plans, details and schedules. Lighting and power built into furniture/equipment shall be modeled.

4.7.2. Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.

4.7.3. Grounding Systems. Grounding Systems. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications grounding systems, bonding), including necessary intelligence to produce accurate plans, details and schedules.

4.7.4. Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents.

4.7.5. Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.

4.7.6. Equipment Clearances. The model shall incorporate and define all electrical and communications working spaces, clearances, and required access

4.8. Fire Protection. The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.8.1. Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled.

4.8.2. Fire Alarms. Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.

4.9. Civil. The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a one inch (1"=100') scaled drawing. Additional minimum Model requirements include:

4.9.1. Terrain (DTM). All relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.

4.9.2. Drainage. All existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.3. Storm Water and Sanitary Sewers. All existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.4. Utilities. All necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.

4.9.5. Roads and Parking. All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

5.0 Section 5 - Ownership and Rights in Data

5.1. Ownership. The Government has ownership of and rights at the date of Closeout Submittal to all CAD files, BIM Model, and Facility Data developed for the Project in accordance with FAR Part 27, clauses incorporated in Section 00 72 00, Contract Clauses and Special Contract Requirement 1.14 GOVERNMENT RE-USE OF DESIGN (Section 00 73 00). The Government may make use of this data following any deliverable.

6.0 Section 6 – Contractor Electives

6.1. Applicable Criteria. If the Contractor elected to include one or more of the following features as an elective in its accepted contract proposal for additional credit during the source selection, as described in the proposal submission requirements and evaluation criteria, the following criteria are requirements, as applicable to those elective feature(s).

6.2. COBIE Compliance. The Model and Facility Data for the Project shall fulfill Construction Operations Building Information Exchange (COBIE) requirements as defined by the Whole Building Design Guide organization, including all requirements for the indexing and submission of Portable Document Format (PDF) and other appropriate file formats that would otherwise be printed and submitted in compliance with Project operations and maintenance handover requirements.

6.3. Project Scheduling using the Model. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of the project construction schedule.

6.3.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver the construction schedule with information derived from the Model.

6.3.1.1. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model for project scheduling.

6.4. Cost Estimating. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of cost estimating requirements, or other applications such as cost analysis and estimate validation.

6.4.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver cost estimating information derived from the Model.

6.4.2. Project completion. At project completion, the Contractor shall provide an MII (Micro Computer Aided Cost Estimating System Generation II) Cost Estimate which follows the USACE Cost Engineering Military Work Breakdown System (WBS), a modified Uniformat, to at least the sub-systems level and uses quantity information supplied directly from BIM output to the maximum extent possible, though other "Gap" quantity information will be included as necessary for a complete and accurate cost estimate.

6.4.2.1. Sub system level extracted quantities from the BIM for use within the estimate shall be provided according to how detailed line items or tasks should be installed/built so that accurate costs can be developed and/or reflected. Therefore, when developing a BIM, the designer shall be cognizant of what tasks need to be separated appropriately at the beginning stages of model development, such as tasks done on the first floor versus the same task on higher floors that will be more labor intensive and therefore need to have a separate quantity and be priced differently. Tasks and their extracted quantities from the BIM shall be broken down by their location (proximity in the structure) as well as the complexity of its installation.

6.4.2.2. At all design stages it shall be understood that BIM output as described in this document will not generate all quantities that are necessary in order to develop a complete and accurate cost estimate of the project based on the design. An example of this would be plumbing that is less than 1.5" diameter and therefore not expected to be modeled due to granularity; this information is commonly referred to as The Gap. Quantities from The Gap and their associated costs shall be included in the final project actual cost estimates as well.

6.5. Other Analyses and Reports. Structural, energy and efficiency, EPACT 2005 & EISA 2007, lighting design, daylighting, electrical power, psychrometric processing, shading, programming, LEED, fire protection, code compliance, Life Cycle Cost, acoustic, plumbing.

7.0 Section 7 – BIM Project Execution Plan Template

7.1. Contractors will utilize the latest version of the USACE BIM PROJECT EXECUTION PLAN (USACE PxP) Template to develop an acceptable Plan. The template can be downloaded from the CAD/BIM Technology Center website.

ATTACHMENT G**DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT**

Organize electronic design submittal files in a subdirectory/file structure in accordance with the following table. The Contractor may suggest a slightly different structure, subject to the discretion of the government.

Design Submittal Directory and Subdirectory File Arrangement.

Directory	Sub-Directory	Sub-Directory or Files	Files
Submittal/Package Name	Narratives	PDF file or files with updated design narrative for each applicable design discipline	
	Drawings	PDF (subdirectory)	Single PDF file with all applicable drawing sheets - bookmarked by sheet number and name
		BIM (subdirectory) See Attachment F.	BIM project folder (with files) per the USACE Workspace. Include an Excel drawing index file with each drawing sheet listed by sheet #, name and corresponding dgn file name (Final Design & Design Complete only)
	Design Analysis & Calculations	Individual PDF files containing design analysis and calculations for each discipline applicable to the submittal	
		PDF file with Fire Protection and Life Safety Code Review checklist	
	LEED	PDF file with updated Leed Check List	
		PDF file or files with LEED Templates for each point with applicable documentation included in each file.	
		LEED SUBMITTALS	
	Energy Analysis	PDF with baseline energy consumption analysis	
		PDF with actual building energy consumption analysis	
	Specifications	Single PDF file with table of contents and all applicable specifications sections.	
		Submittal Register (Final Design & Design Complete submittal only)	
	Design Quality Control	PDF file or files with DQC checklist(s) and/or statements	
	Building Rendering(s)	PDF file of rendering for each building type included in contract (Final Design & Design Complete).	

SECTION 01 45 01.10
QUALITY CONTROL SYSTEM (QCS)

1.0 GENERAL

- 1.1. CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS
- 1.2. QCS SOFTWARE
- 1.3. SYSTEM REQUIREMENTS
- 1.4. RELATED INFORMATION
- 1.5. CONTRACT DATABASE
- 1.6. DATABASE MAINTENANCE
- 1.7. IMPLEMENTATION
- 1.8. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM
- 1.9. MONTHLY COORDINATION MEETING
- 1.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. The Contractor module, user manuals, updates, and training information can be downloaded from the RMS web site. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

- Administration
- Finances
- Quality Control
- Submittal Monitoring
- Scheduling
- Import/Export of Data
- Request for Information
- Accident Reporting
- Safety Exposure Manhours

1.1. CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS

For ease and speed of communications, both Government and Contractor will exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.2. OTHER FACTORS

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01 32 01.00 10, PROJECT SCHEDULE, Section 01 33 00, SUBMITTAL PROCEDURES, and Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

1.3. QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

1.4. SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run QCS:

(a) Hardware

- IBM-compatible PC with 1000 MHz Pentium or higher processor
- 256 MB RAM for workstation / 512+ MB RAM for server
- 1 GB hard drive disk space for sole use by the QCS system
- Compact disk (CD) Reader, 8x speed or higher
- SVGA or higher resolution monitor (1024 x 768, 256 colors)
- Mouse or other pointing device
- Windows compatible printer (Laser printer must have 4+ MB of RAM)
- Connection to the Internet, minimum 56K BPS

(b) Software

- MS Windows 2000 or higher
- MS Word 2000 or newer
- Latest version of : Netscape Navigator, Microsoft Internet Explorer, or other browser that supports HTML 4.0 or higher
- Electronic mail (E-mail), MAPI compatible
- Virus protection software that is regularly upgraded with all issued manufacturer's updates

1.5. RELATED INFORMATION

1.5.1. QCS USER GUIDE

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.5.2. CONTRACTOR QUALITY CONTROL (CQC) TRAINING

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.6. CONTRACT DATABASE

Prior to the pre-construction conference, the Government will provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by using the government's SFTP repository built into QCS import/export function. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.7. DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Data updates to the Government, e.g., daily reports, submittals, RFI's, schedule updates, payment requests, etc. shall be submitted using the government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, email or CD-ROM may be used instead (see Paragraph DATA SUBMISSION VIA CD-ROM). The QCS database typically shall include current data on the following items:

1.7.1. ADMINISTRATION

1.7.1.1. Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver Contractor administrative data in electronic format.

1.7.1.2. Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver subcontractor administrative data in electronic format.

1.7.1.3. Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with "S". Letters initiated by the Contractor's home (main)

office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

All Requests For Information (RFI) shall be exchanged using the Built-in RFI generator and tracker in QCS.

1.7.1.4. Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.7.1.5. Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

1.7.2. FINANCES

1.7.2.1. Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the design and construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.7.2.2. Payment Requests

All progress payment requests shall be prepared using QCS. The Contractor shall complete the payment request worksheet prompt payment certification, and payment invoice in QCS. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using QCS. The Contractor shall submit the payment request, prompt payment certification, and payment invoice with supporting data by using the government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, E-mail or a CD-ROM may be used. A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

1.7.3. Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The Contractor shall maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the Contractor shall submit a QCS update reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.7.3.1. Daily Contractor Quality Control (CQC) Reports

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government within 24 hours after the date covered by the report. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

1.7.3.2. Deficiency Tracking

The Contractor shall use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

1.7.3.3. QC Requirements

The Contractor shall develop and maintain a complete list of QC testing and required structural and life safety special inspections required by the International Code Council (ICC), transferred and installed property, and user training requirements in QCS. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

1.7.3.4. Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.7.3.5. Labor and Equipment Hours

The Contractor shall log labor and equipment exposure hours on a daily basis. This data will be rolled up into a monthly exposure report.

1.7.3.6. Accident/Safety Tracking Reporting

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize QCS to advise the Government of any accidents occurring on the jobsite. This supplemental entry is not to be considered as a substitute for completion of mandatory notification and reports, e.g., ENG Form 3394 and OSHA Form 300.

1.7.3.7. Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.7.3.8. Hazard Analysis

The Contractor shall use QCS to develop a hazard analysis for each feature of work included in its CQC Plan. The hazard analysis shall address any hazards, or potential hazards, that may be associated with the work

1.7.4. Submittal Management

The Government will provide the submittal register form, ENG Form 4288, SUBMITTAL REGISTER, in electronic format. The Contractor and Designer of Record (DOR) shall develop and maintain a complete list of all submittals, including completion of all data columns and shall manage all submittals. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. QCS and RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.7.5. Schedule

The Contractor shall develop a design and construction schedule consisting of pay activities, in accordance with Section 01 32 01.00 10, PROJECT SCHEDULE, as applicable. This schedule shall be input and maintained in the QCS database either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01 32 01.00 10 PROJECT SCHEDULE). The updated schedule data shall be included with each pay request submitted by the Contractor.

1.7.5.1. Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data from RMS, and schedule data using SDEF.

1.8. IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.9. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

The Government-preferred method for Contractor's submission of QCS data is by using the government's SFTP repository built into QCS export function.. Other data should be submitted using E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of CD-ROM for data transfer. Data on CDs shall be exported using the QCS built-in export function. If used, CD-ROMs will be submitted in accordance with the following:

1.9.1. File Medium

The Contractor shall submit required data on CD-ROMs. They shall conform to industry standards used in the United States. All data shall be provided in English.

1.9.2. Disk Or Cd-Rom Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

1.9.3. File Names

The files will be automatically named by the QCS software. The naming convention established by the QCS software shall not be altered in any way by the Contractor.

1.10. MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions.

The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.11. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification.

End of Section 01 45 01.10

**SECTION 01 45 04.00 10
CONTRACTOR QUALITY CONTROL**

1.0 GENERAL

1.1. REFERENCES

1.2. PAYMENT

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.2. QUALITY CONTROL PLAN

3.3. COORDINATION MEETING

3.4. QUALITY CONTROL ORGANIZATION

3.5. SUBMITTALS AND DELIVERABLES

3.6. CONTROL

3.7. TESTS

3.8. COMPLETION INSPECTION

3.9. DOCUMENTATION

3.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Refer to the latest edition, as of the date of the contract solicitation.

- ASTM INTERNATIONAL (ASTM)
- ASTM D 3740 Minimum Requirements for Agencies
Engaged in the Testing and/or Inspection
of Soil and Rock as Used in Engineering
Design and Construction
- ASTM E 329 Agencies Engaged in the Testing
and/or Inspection of Materials Used in
Construction
- U.S. ARMY CORPS OF ENGINEERS (USACE)
ER 1110-1-12 Quality Management

1.2. PAYMENT

There will be no separate payment for providing and maintaining an effective Quality Control program. Include all costs associated therewith in the applicable unit prices or lump-sum prices contained in the Contract Line Item Schedule.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product, which complies with the contract requirements. The system shall cover all design and construction operations, both onsite and offsite, and shall be keyed to the proposed design and construction sequence. The site project superintendent is responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2. QUALITY CONTROL PLAN

Furnish for Government review, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Design and construction may begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. The Government will not permit work outside of the features of work included in an accepted interim plan to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started. Where the applicable Code issued by the International Code Council calls for an inspection by the Building Official, the Contractor shall include the inspections in the Quality Control Plan and shall perform the inspections. The Designer of Record shall develop a program for any special inspections required by the applicable International Codes and the Contractor shall perform these inspections, using qualified inspectors. Include the special inspection plan in the QC Plan.

3.2.1. Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

3.2.1.1. A description of the quality control organization. Include a chart showing lines of authority and an acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. A CQC System Manager shall report to the project superintendent or someone higher in the contractor's organization.

3.2.1.2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function. Also include those responsible for performing and documenting the inspections required by the International Codes and the special inspection program developed by the designer of record.

3.2.1.3. A copy of the letter to the CQC System Manager, signed by an authorized official of the firm, which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Furnish copies of these letters.

3.2.1.4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

3.2.1.5. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Use only Government approved Laboratory facilities.

3.2.1.6. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

3.2.1.7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

3.2.1.8. Reporting procedures, including proposed reporting formats.

3.2.1.9. A list of the definable features of work. A definable feature of work is a task, which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.1.10. A list of all inspections required by the International Codes and the special inspection program required by the code and this contract.

3.2.2. Additional Requirements for Design Quality Control (DQC) Plan

The following additional requirements apply to the Design Quality Control (DQC) plan:

3.2.2.1. The Contractor's QCP Plan shall provide and maintain a Design Quality Control (DQC) Plan as an effective quality control program which will assure that all services required by this design-build contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, competent, independent reviewers identified in the DQC Plan shall review all documents. Use personnel who were not involved in the design effort to produce the design to perform the independent technical review (ITR). The ITR is intended as a quality control check of the design. Include, at least, but not necessarily limited to, a review of the contract requirements (the accepted contract or task order proposal and amended RFP), the basis of design, design calculations, the design configuration management documentation and check the design documents for

errors, omissions, and for coordination and design integration. The ITR team is not required to examine, compare or comment concerning alternate design solutions but should concentrate on ensuring that the design meets the contract requirements. Correct errors and deficiencies in the design documents prior to submitting them to the Government.

3.2.2.2. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists at each design phase as part of the project documentation.

3.2.2.3. A Design Quality Control Manager, who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated, shall implement the DQC Plan. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. Notify the Government, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

3.2.3. Acceptance of Plan

Government acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4. Notification of Changes

After acceptance of the CQC Plan, notify the Government in writing of any proposed change. Proposed changes are subject to Government acceptance.

3.3. COORDINATION MEETING

After the Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, the Contractor and the Government shall meet and discuss the Contractor's quality control system. Submit the CQC Plan for review a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. The Government will prepare minutes of the meeting for signature by both parties. . The minutes shall become a part of the contract file. There may be occasions when either party will call for subsequent conferences to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4. QUALITY CONTROL ORGANIZATION

3.4.1. Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, a Design Quality Manager, and sufficient number of additional qualified personnel to ensure contract compliance. The CQC organization shall also include personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly. The Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly furnish complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2. CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System

Manager shall be a graduate engineer, graduate architect, or a BA/BS graduate of an ACCE accredited construction management college program. The CQC system Manager may alternately be an engineering technician with at least 2 years of college and an ICC certification as a Commercial Building Inspector (Residential Building Inspector certification will be required for Military Family Housing projects). In addition, the CQC system manager shall have a minimum of 5 years construction experience on construction similar to this contract. The CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. Assign the CQC System Manager no other duties (except may also serve as Safety and Health Officer, if qualified and if allowed by Section 00 73 00). Identify an alternate for the CQC System Manager in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager but the alternate may have other duties in addition to serving in a temporary capacity as the acting QC manager.

3.4.3. CQC Personnel

3.4.3.1. In addition to CQC personnel specified elsewhere in the contract provide specialized CQC personnel to assist the CQC System Manager in accordance with paragraph titled Area Qualifications.

3.4.3.2. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; **are not intended to be full time, but must be physically present at the construction site during work on their areas of responsibility**; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan. **One person may cover more than one area, provided that they are qualified to perform QC activities for the designated areas below and provided that they have adequate time to perform their duties:**

3.4.4. Experience Matrix

3.4.4.1. Area Qualifications

3.4.4.1.1. Civil - Graduate Civil Engineer or (BA/BS) graduate in construction management with 4 years experience in the type of work being performed on this project or engineering technician with 5 yrs related experience.

3.4.4.1.2. Mechanical - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Mechanical Inspector with 5 yrs related experience.

3.4.4.1.3. Electrical - Graduate Electrical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Electrical Inspector with 5 yrs related experience.

3.4.4.1.4. Structural - Graduate Structural Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or person with an ICC certification as a Reinforced Concrete Special Inspector and Structural Steel and Bolting Special Inspector (as applicable to the type of construction involved) with 5 yrs related experience.

3.4.4.1.5. Plumbing - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience, or person with an ICC certification as a Commercial Plumbing Inspector with 5 yrs related experience.

3.4.4.1.6. Concrete, Pavements and Soils Materials Technician (present while performing tests) with 2 yrs experience for the appropriate area

3.4.4.1.7. Testing, Adjusting and Balancing Specialist must be a member (TAB) Personnel of AABC or an experienced technician of the firm certified by the NEBB (present while testing, adjusting, balancing).

3.4.4.1.8. Design Quality Control Manager Registered Architect or Professional Engineer (not required on the construction site)

3.4.4.1.9. Registered Fire Protection Engineer with 4 years related experience or engineering technician with 5 yrs related experience (but see requirements for Fire Protection Engineer of Record to witness final testing in Section 01 10 00, paragraph 5.10, Fire Protection).

3.4.4.1.10. QC personnel assigned to the installation of the telecommunication system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification. In lieu of BICSI certification, QC personnel shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products. QC personnel shall witness and certify the testing of telecommunications cabling and equipment.

3.4.5. Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors". This course is periodically offered at Fort Leonard Wood. Inquire of the District or Division sponsoring the course for fees and other expenses involved, if any, for attendance at this course.

3.4.6. Organizational Changes

When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5. SUBMITTALS AND DELIVERABLES

Make submittals as specified in Section 01 33 00 **SUBMITTAL PROCEDURES**. The CQC organization shall certify that all submittals and deliverables are in compliance with the contract requirements.

3.6. CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The CQC organization shall conduct at least three phases of control for each definable feature of the construction work as follows:

3.6.1. Preparatory Phase

Perform this phase prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

3.6.1.1. A review of each paragraph of applicable specifications, reference codes, and standards. Make a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field at the preparatory inspection. Maintain these copies in the field, available for use by Government personnel until final acceptance of the work.

3.6.1.2. A review of the contract drawings.

3.6.1.3. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

3.6.1.4. Review of provisions that have been made to provide required control inspection and testing.

3.6.1.5. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

3.6.1.6. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

3.6.1.7. A review of the appropriate activity hazard analysis to assure safety requirements are met.

3.6.1.8. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

3.6.1.9. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

3.6.1.10. Discussion of the initial control phase.

3.6.1.11. Notify the Government at least 24 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2. Initial Phase

Accomplish this phase at the beginning of a definable feature of work. Include the following actions:

3.6.2.1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

3.6.2.2. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

3.6.2.3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

3.6.2.4. Resolve all differences.

3.6.2.5. Check safety to include compliance with and upgrading of the Accident Prevention plan and activity hazard analysis. Review the activity analysis with each worker.

3.6.2.6. Notify the Government at least 24 hours in advance of beginning the initial phase. The CQC System Manager shall prepare and attach to the daily CQC report separate minutes of this phase. Indicate exact location of initial phase for future reference and comparison with follow-up phases.

3.6.2.7. Repeat the initial phase any time acceptable specified quality standards are not being met.

3.6.3. Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Conduct final follow-up checks and correct deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4. Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7. TESTS

3.7.1. Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements and project design documents. Upon request, furnish to the Government

duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory, or establish an approved testing laboratory at the project site. The Contractor may elect to use a laboratory certified and accredited by the Concrete and cement Reference Laboratory (CCRL) or by AASHTO Materials Reference Laboratory (AMRL) for testing procedures that those organizations certify. The Contractor shall perform the following activities and record and provide the following data:

3.7.1.1. Verify that testing procedures comply with contract requirements and project design documents.

3.7.1.2. Verify that facilities and testing equipment are available and comply with testing standards.

3.7.1.3. Check test instrument calibration data against certified standards.

3.7.1.4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

3.7.1.5. Include results of all tests taken, both passing and failing tests, recorded on the CQC report for the date taken. Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2. Testing Laboratories

3.7.2.1. Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2. Capability Recheck

If the selected laboratory fails the capability check, the Government will assess the Contractor a charge of \$1,375 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3. Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4. Furnishing or Transportation of Samples for Government Quality Assurance Testing

The Contractor is responsible for costs incidental to the transportation of samples or materials. Deliver samples of materials for test verification and acceptance testing by the Government to the Corps of Engineers Laboratory, f.o.b., at the following address:

- For delivery by mail:
 - The Government Contract Laboratory Designated by the Area Office
 - Not Applicable
 - Not Applicable
 - Not Applicable
- For other deliveries:
 - The Government Contract Laboratory Designated by the Area Office

Not Applicable

Not Applicable

Not Applicable

The area or resident office will coordinate, exact delivery location, and dates for each specific test.

3.8. COMPLETION INSPECTION

3.8.1. Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. Prepare a punch list of items which do not conform to the approved drawings and specifications and include in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2. Pre-Final Inspection

As soon as practicable after the notification above, the Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. Accomplish these inspections and any deficiency corrections required by this paragraph within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3. Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall attend the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups and major commands may also attend. The Government will formally schedule the final acceptance inspection based upon results of the Pre-Final inspection. Provide notice to the Government at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9. DOCUMENTATION

3.9.1. Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers using government-provided software, QCS (see Section 01 45 01.10). The report includes, as a minimum, the following information:

3.9.1.1. Contractor/subcontractor and their area of responsibility.

3.9.1.2. Operating plant/equipment with hours worked, idle, or down for repair.

3.9.1.3. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

- 3.9.1.4. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the applicable control phase (Preparatory, Initial, Follow-up). List deficiencies noted, along with corrective action.
- 3.9.1.5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- 3.9.1.6. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- 3.9.1.7. Offsite surveillance activities, including actions taken.
- 3.9.1.8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- 3.9.1.9. Instructions given/received and conflicts in plans and/or specifications.
- 3.9.1.10. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identity of the ITR team, the ITR review comments, responses and the record of resolution of the comments.
- 3.9.2. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, submit one report for every 7 days of no work and on the last day of a no work period. Account for all calendar days throughout the life of the contract. The first report following a day of no work shall be for that day only. The CQC System Manager shall sign and date reports. The report shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel. The Contractor may submit these forms electronically, in lieu of hard copy.

3.10. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

End of Section 01 45 04.00 10

SECTION 01 50 02
TEMPORARY CONSTRUCTION FACILITIES

1.0 OVERVIEW

- 1.1. GENERAL REQUIREMENTS
- 1.2. AVAILABILITY AND USE OF UTILITY SERVICES
- 1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN
- 1.4. PROTECTION AND MAINTENANCE OF TRAFFIC
- 1.5. MAINTENANCE OF CONSTRUCTION SITE
- 1.6. GOVERNMENT FIELD OFFICE

1.0 OVERVIEW

1.1. GENERAL REQUIREMENTS

1.1.1. Site Plan

Prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Also indicate if the use of a supplemental or other staging area is desired.

1.2. AVAILABILITY AND USE OF UTILITY SERVICES

1.2.1. See Section 00 72 00, Contract Clauses and Section 00 73 00, Special Contract Requirements, for Utility Availability requirements.

1.2.2. Sanitation

Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

1.2.3. Telephone

Make arrangements and pay all costs for desired telephone facilities.

1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.3.1. Bulletin Board

Immediately upon beginning of onsite work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Display legible copies of the aforementioned data until work is completed. Remove the bulletin board from the site upon completion of the project.

1.3.2. Project and Safety Signs

Erect a project sign and a site safety sign with informational details as provided by the Government at the Post award conference, within 15 days prior to any work activity on project site. Update the safety sign data daily, with light colored metallic or non-metallic numerals. Remove the signs from the site upon completion of the project. Engineer Pamphlet EP 310-1-6a contains the standardized layout and construction details for the signs. It can be found through a GOOGLE Search or try <http://www.usace.army.mil/publications/eng-pamphlets/ep310-1-6a/s-16.pdf>.

1.4. PROTECTION AND MAINTENANCE OF TRAFFIC

Provide access and temporary relocated roads as necessary to maintain traffic. Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Take measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property.

The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. Investigate the adequacy of existing roads and the allowable load limit on these roads. Repair any damage to roads caused by construction operations.

1.4.1. Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Construct haul roads with suitable grades and widths. Avoid sharp curves, blind corners, and dangerous cross traffic. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Provide adequate lighting to assure full and clear visibility for full width of haul road and work areas during any night work operations. Remove haul roads designated by the Contracting Officer upon completion of the work and restore those areas.

1.4.2. Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.5. MAINTENANCE OF CONSTRUCTION SITE

Mow grass and vegetation located within the boundaries of the construction site for the duration of the project, from NTP to contract completion. Edge or neatly trim grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers from NTP to contract completion.

1.6. GOVERNMENT FIELD OFFICE

1.6.1. Resident Engineer's Office

Provide the Government Resident Engineer with an office, approximately 900 square feet in floor area, co-located on the project site with the Contractor's office and providing space heat, air conditioning, electric light and power, power and communications outlets and toilet facilities consisting of at least one lavatory and at least one water closet complete with connections to water and sewer mains. Provide a mail slot in the door or a lockable mail box mounted on the surface of the door. Provide outlets for 10 government phones and same number of LAN connections for Government computers. Coordinate with the Resident Engineer for locations. Provide a conference room with space large enough for 12 personnel to hold meetings. Provide a minimum of two outlets per government work station and at least one outlet per 10 feet of wall space for other government equipment. Provide at least twice weekly janitorial service. Remove the office facilities upon completion of the work and restore those areas. Connect and disconnect utilities in accordance with local codes and to the satisfaction of the Contracting Officer.

1.6.2. Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer and providing as a minimum the facilities specified above. Securely anchor the trailer to the ground at all four corners to guard against movement during high winds, per EM 385-1-1.

End of Section 01 50 02

**SECTION 01 57 20.00 10
ENVIRONMENTAL PROTECTION**

1.0 GENERAL REQUIREMENTS

- 1.1. SUBCONTRACTORS
- 1.2. ENVIRONMENTAL PROTECTION PLAN
- 1.3. PROTECTION FEATURES
- 1.4. ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS
- 1.5. NOTIFICATION

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION

- 3.1. LAND RESOURCES
- 3.2. WATER RESOURCES
- 3.3. AIR RESOURCES
- 3.4. CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL
- 3.5. RECYCLING AND WASTE MINIMIZATION
- 3.6. HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES
- 3.7. BIOLOGICAL RESOURCES
- 3.8. INTEGRATED PEST MANAGEMENT
- 3.9. PREVIOUSLY USED EQUIPMENT
- 3.10. MILITARY MUNITIONS
- 3.11. TRAINING OF CONTRACTOR PERSONNEL
- 3.12. POST CONSTRUCTION CLEANUP

1.0 GENERAL REQUIREMENTS

Minimize environmental pollution and damage that may occur as the result of construction operations. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations

1.1. SUBCONTRACTORS

Ensure compliance with this section by subcontractors.

1.2. ENVIRONMENTAL PROTECTION PLAN

1.2.1. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Define issues of concern within the Environmental Protection Plan as outlined in this section. Address each topic in the plan at a level of detail commensurate with the environmental issue and required construction task(s). Identify and discuss topics or issues which are not identified in this section, but which the Contractor considers necessary, after those items formally identified in this section. Prior to commencing construction activities or delivery of materials to the site, submit the Plan for review and Government approval. The Contractor shall meet with the Government prior to implementation of the Environmental Protection Plan, for the purpose of discussing the implementation of the initial plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. Maintain and keep the Environmental Protection Plan current onsite.

1.2.2. Compliance

No requirement in this Section shall be construed as relieving the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.2.3. Contents

The plan shall include, but shall not be limited to, the following:

1.2.3.1. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.

1.2.3.2. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable

1.2.3.3. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel

1.2.3.4. Description of the Contractor's environmental protection personnel training program

1.2.3.5. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. Include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

1.2.3.6. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site

1.2.3.7. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

1.2.3.8. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

1.2.3.9. Drawing showing the location of on-installation borrow areas.

1.2.3.10. A spill control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The spill control plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

- (a) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Government and the local Fire Department in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.
- (b) The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup
- (c) Training requirements for Contractor's personnel and methods of accomplishing the training
- (d) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.
- (e) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency
- (f) The methods and procedures to be used for expeditious contaminant cleanup

1.2.3.11. A solid waste management plan identifying waste minimization, collection, and disposals methods, waste streams (type and quantity), and locations for solid waste diversion/disposal including clearing debris and C&D waste that is diverted (salvaged, reused, or recycled). Detail the contractor's actions to comply with, and to participate in, Federal, state, regional, local government, and installation sponsored recycling programs to reduce the volume of solid waste at the source. Identify any subcontractors responsible for the transportation, salvage and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility. Attach evidence of the facility's ability to accept the solid waste to this plan. A construction and demolition waste management plan, similar to the plan specified in the UFGS 01 74 19 (formerly 01572) may be used as the non-hazardous solid waste management plan. Provide a Non-Hazardous Solid Waste Diversion Report. Submit the report on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and each quarter thereafter (e.g. the first working day of January, April, July, and October) until the end of the project. Additionally, a summary report, with all data fields, is required at the end of the project. The report shall indicate the total type and amount of waste generated, total type and amount of waste diverted, type and amount of waste sent to waste-to-energy facility and alternative daily cover, in tons along with the percent that was diverted. Maintain, track and report construction and demolition waste data in a manner such that the installation can enter the data into the Army SWAR database, which separates data by type of material. A cumulative report in LEED Letter Template format may be used but must be modified to include the date disposed of/diverted and include the above stated diversion data. NOTE: The Solid Waste Diversion Reports are separate documentation that the LEED documentation.

1.2.3.12. DELETED.

1.2.3.13. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

1.2.3.14. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of

these materials. In accordance with EM 385-1-1, include a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time in the contaminant prevention plan. Update the plan as new hazardous materials are brought on site or removed from the site. Reference this plan in the storm water pollution prevention plan, as applicable.

1.2.3.15. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented and any required permits. If surface discharge will be the method of disposal, include a copy of the permit and associated documents as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, include documentation that the waste water treatment plant Operator has approved the flow rate, volume, and type of discharge.

1.2.3.16. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. Include methods to assure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Government.

1.2.3.17. A pesticide treatment plan, updated, as information becomes available. Include: sequence of treatment, dates, times, locations, pesticide trade name, EPA registration numbers, authorized uses, chemical composition, formulation, original and applied concentration, application rates of active ingredient (i.e. pounds of active ingredient applied), equipment used for application and calibration of equipment. The Contractor is responsible for Federal, State, Regional and Local pest management record keeping and reporting requirements as well as any additional Installation specific requirements. Follow AR 200-5 Pest Management, Chapter 2, Section III "Pest Management Records and Reports" for data required to be reported to the Installation.

1.3. PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Government shall make a joint condition survey. Immediately following the survey, the Contractor shall prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. Both the Contractor and the Government will sign this survey, upon mutual agreement as to its accuracy and completeness. The Contractor develop a plan that depicts how it will protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the Contractor's work under the contract.

1.4. ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the Contractor, from the drawings, plans and specifications which may have an environmental impact will be subject to approval by the Government and may require an extended review, processing, and approval time. The Government reserves the right to disapprove alternate methods, even if they are more cost effective, if the Government determines that the proposed alternate method will have an adverse environmental impact.

1.5. NOTIFICATION

The Government will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. The Contractor shall, after receipt of such notice, inform the Government of the proposed corrective action and take such action when approved by the Government. The Government may issue an order stopping all or part of the

work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the Contractor for any such suspensions. This is in addition to any other actions the Government may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION

3.1. LAND RESOURCES

Confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. Do not attach or fasten any ropes, cables, or guys to any trees for anchorage unless specifically authorized. Provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Remove all stone, soil, or other materials displaced into uncleared areas..

3.1.1. Work Area Limits

Prior to commencing construction activities, mark the areas that need not be disturbed under this contract. Mark or fence isolated areas within the general work area which are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. Personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

3.1.2. Landscape

Clearly identify trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved by marking, fencing, or wrapping with boards, or any other approved techniques. Restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.1.3. Erosion and Sediment Controls

Provide erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. Coordinate with approving authorities (federal, state, etc.) for specific requirements to be included in the plan. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. Keep the area of bare soil exposed at any one time by construction operations to a minimum necessary. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. Remove any temporary measures after the area has been stabilized.

3.1.4. Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Government. Make only approved temporary movement or relocation of Contractor facilities. Provide erosion and sediment controls for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant and/or work areas to protect adjacent areas.

3.2. WATER RESOURCES

Monitor construction activities to prevent pollution of surface and ground waters. Do not apply toxic or hazardous chemicals to soil or vegetation unless otherwise indicated. Monitor all water areas affected by construction activities. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by state or federally issued Clean Water Act permits.

3.2.1. Stream Crossings

Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the Federal, State, and local governments or impede state-designated flows.

3.2.2. Wetlands

Do not enter, disturb, destroy, or allow discharge of contaminants into any wetlands.

3.3. AIR RESOURCES

Comply with all Federal and State air emission and performance laws and standards for equipment operation, activities, or processes.

3.3.1. Particulates

Control dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants, including weekends, holidays and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods are permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with all State and local visibility regulations.

3.3.2. Odors

Control odors from construction activities at all times. Odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

3.3.3. Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the state and Installation rules.

3.3.4. Burning

Burning is not allowed on the project site unless specified in other sections of the specifications or by written authorization. Specific times, locations, and manners of burning shall be subject to approval.

3.4. CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.4.1. Solid Wastes

Place solid wastes (excluding clearing debris) in containers which are emptied on a regular schedule. Conduct handling, storage, and disposal to prevent contamination. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with solid waste. Transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. The minimum acceptable off-site solid waste disposal option is a Subtitle D RCRA permitted landfill. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. Comply with Federal, State, and local laws and regulations pertaining to the use of landfill areas.

3.4.2. Chemicals and Chemical Wastes

Dispense chemicals, ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. The Government may periodically review this documentation. Collect chemical waste in corrosion resistant, compatible containers. Monitor and remove collection drums to a staging or storage area when contents are within 6 inches of the top. Classify, manage, store, and dispose of wastes in accordance with Federal, State, and local laws and regulations.

3.4.3. Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable state and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste in compliance with 40 CFR 262. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes; protect it from the weather by placing it in a safe covered location and take precautionary measures, such as berming or other appropriate measures, against accidental spillage. Store, describe, package, label, mark, and placard hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, state, and local laws and regulations. Transport Contractor generated hazardous waste off Government property in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. Dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Immediately report spills of hazardous or toxic materials to the Government and the Facility Environmental Office. Contractor will be responsible for cleanup and cleanup costs due to spills. Contractor is responsible for the disposition of Contractor generated hazardous waste and excess hazardous materials.

3.4.4. Fuel and Lubricants

Conduct storage, fueling and lubrication of equipment and motor vehicles in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations.

3.5. RECYCLING AND WASTE MINIMIZATION

Participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project. Line and berm fueling areas and establish storm water control structures at discharge points for site run-off. Keep a liquid containment clean-up kit available at the fueling area.

3.6. HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Existing historical, archaeological, and cultural resources within the Contractor's work area are shown on the drawings. Protect and preserve these resources during the life of the Contract. Temporarily suspend all activities that may damage or alter such resources, if any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found during excavation or other construction activities. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, notify the Government so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

3.7. BIOLOGICAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitat. Protect threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

3.8. INTEGRATED PEST MANAGEMENT

Coordinate, through the Government, with the Installation Pest Management Coordinator (IPMC) at the earliest possible time prior to pesticide application, in order to minimize impacts to existing fauna and flora. Discuss

integrated pest management strategies with the IPMC and receive concurrence from the IPMC, through the COR, prior to the application of any pesticide associated with these specifications. Give IMPC personnel the opportunity to be present at all meetings concerning treatment measures for pest or disease control and during application of the pesticide. The use and management of pesticides are regulated under 40 CFR 152 - 186.

3.8.1. Pesticide Delivery and Storage

Deliver pesticides, approved for use on the Installation, to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

3.8.2. Qualifications

Use the services of a subcontractor for pesticide application whose principal business is pest control. The subcontractor shall be licensed and certified in the state where the work is to be performed.

3.8.3. Pesticide Handling Requirements

Formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions.

3.8.4. Application

A state certified pesticide applicator shall apply pesticides in accordance with EPA label restrictions and recommendations.

3.9. PREVIOUSLY USED EQUIPMENT

Clean all previously used construction equipment prior to bringing it onto the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

3.10. MILITARY MUNITIONS

Immediately stop work in that area and immediately inform the Government, in the event military munitions, as defined in 40 CFR 260, are discovered or uncovered.

3.11. TRAINING OF CONTRACTOR PERSONNEL

Train personnel in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all Contractor personnel prior to commencing construction activities. Conduct additional meetings for new personnel and when site conditions change. The training and meeting agenda shall include methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.12. POST CONSTRUCTION CLEANUP

Clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade, fill and seed the entire disturbed area, unless otherwise indicated.

**SECTION 01 62 35
RECYCLED/RECOVERED MATERIAL**

1.0 GENERAL

1.1. REFERENCES

1.2. OBJECTIVES

1.3. EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

1.4. EPA PROPOSED ITEMS INCORPORATED IN THE WORK

1.5. EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

1.0 GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
- 40 CFR 247 Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2. OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

1.3. EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials, when incorporated into the work under this contract, shall contain at least the minimum percentage of recycled or recovered materials indicated by EPA unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

1.4. EPA PROPOSED ITEMS INCORPORATED IN THE WORK

Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

1.5. EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be use by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

End of Section 01 62 35

**SECTION 01 78 02.00 10
CLOSEOUT SUBMITTALS**

1.0 OVERVIEW

- 1.1. SUBMITTALS
- 1.2. PROJECT RECORD DOCUMENTS
- 1.3. EQUIPMENT DATA
- 1.4. CONSTRUCTION WARRANTY MANAGEMENT
- 1.5. MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING
- 1.6. OPERATION AND MAINTENANCE MANUALS
- 1.7. FIELD TRAINING
- 1.8. PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY
- 1.9. LEED REVIEW MEETINGS
- 1.10. RED ZONE MEETING
- 1.11. FINAL CLEANING
- 1.12. INTERIM FORM DD1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY"

EXHIBIT 1 SAMPLE RED ZONE MEETING CHECKLIST

1.0 OVERVIEW

1.1. SUBMITTALS

Government approval is required for any submittals with a "G" designation; submittals not having a "G" designation are for Designer of Record approval or for information only. Submit the following in accordance with Section 01 33 00 submittals:

SD-02 Shop Drawings

- As-Built Drawings - G
 - Drawings showing final as-built conditions of the project. Provide electronic drawing files as specified in Section 01 33 16, 3 sets of blue-line prints and one set of the approved working as-built drawings.

SD-03 Product Data

- As-Built Record of Equipment and Materials
 - Two copies of the record listing the as-built materials and equipment incorporated into the construction of the project.
- Construction Warranty Management Plan
 - Three sets of the construction warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.
- Warranty Tags
 - Two record copies of the warranty tags showing the layout and design.
- Final Cleaning
 - Two copies of the listing of completed final clean-up items.

1.2. PROJECT RECORD DOCUMENTS

1.2.1. As-Built Drawings – G

An as-built drawing is a construction drawing revised to reflect the final as-built conditions of the project as a result of modifications and corrections to the project design required during construction. The final as-built drawings shall not have the appearance of marked up drawings, but that of professionally prepared drawings as if they were the "as designed" drawings.

1.2.2. Maintenance of As-Built Drawings

1.2.2.1. The Configuration Management Plan shall describe how the Contractor will maintain up-to-date drawings, how it will control and designate revisions to the drawings and specifications (In accordance with Special Contract Requirement: ***Deviating from the Accepted Design*** and Section 01 33 16: ***Design after Award***, the Designer of Record's approval is necessary for any revisions to the accepted design).

1.2.2.2. Make timely updates, carefully maintaining a record set of working as-built drawings at the job site, marked in red, of all changes and corrections from the construction drawings. Enter changes and corrections on drawings promptly to reflect "Current Construction". Perform this update no less frequently than weekly for the blue line drawings and update no less frequently than quarterly for the CADD/CAD and BIM files, which were prepared previously in accordance with Section 01 33 16. Include a confirmation that the as-builts are up to date with the submission of the monthly project schedule.

1.2.2.3. If the DB Contractor fails to maintain the as-built drawings as required herein, the Government will retain from the monthly progress payment, an amount representing the estimated monthly cost of maintaining the as-built drawings. Final payment with respect to separately priced facilities or the contract as a whole will be withheld until the Contractor submits acceptable as-built drawings and the Government approves them.

1.2.2.4. The marked-up set of drawings shall reflect any changes, alterations, adjustments or modifications. Changes must be reflected on all sheets affected by the change. Changes shall include marking the drawings to reflect structural details, foundation layouts, equipment sizes, and other extensions of design.

1.2.2.5. Typically, room numbers shown on the drawings are selected for design convenience and do not represent the actual numbers intended for use by the end user. Final as-built drawings shall reflect actual room numbers adopted by the end user.

1.2.2.6. If there is no separate contract line item (CLIN) for as-built drawings, the Government will withhold the amount of \$35,000, or 1% of the present construction value, whichever is the greater, until the final as-built drawing submittal has been approved by the Government.

1.2.3. Underground Utilities

The drawings shall indicate, in addition to all changes and corrections, the actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Locate Valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Record average elevation of the top of each run or underground structure..

1.2.4. Partial Occupancy

For projects where portions of construction are to be occupied or activated before overall project completion, including portions of utility systems, supply as-built drawings for those portions of the facility being occupied or activated at the time the facility is occupied or activated. Show this same as-built information previously furnished on the final set of as-built drawings.

1.2.5. As-Built Conditions That are Different From the construction Drawings

Accurately reflect all as-built conditions that are different, such as dimensions, road alignments and grades, and drainage and elevations, from the construction drawings on each drawing. If the as-built condition is accurately reflected on a shop drawing, then furnish that shop drawing in CADD format. Reference the final as-built construction drawing the shop drawing file that includes the as-built information. In turn, the shop drawing shall reference the applicable construction as-built drawing. Delete any options shown on drawings and not selected clearly reflect options selected on final as-built drawings.

1.2.6. Additional As-Built Information that Exceeds the Detail Shown on the construction Drawings:

These as-built conditions include those that reflect structural details, foundation layouts, equipment, sizes, mechanical and electrical room layouts and other extensions of design, that were not shown in the project design documents because the exact details were not known until after the time of approved shop drawings. It is recognized that these shop drawing submittals (revised showing as-built conditions) will serve as the as-built record without actual incorporation into the construction drawings, piping, and equipment drawings. Include locations of all explorations, logs of all explorations, and results of all laboratory testing, including those provided by the Government. Furnish all such shop drawings in CADD /CADformat. Include fire protection details, such as wiring, performed for the design of the project.

1.2.7. Final As-Built Drawings

Submit final as-built CADD/CAD and BIM Model(s) and Facility Data files at the time of Beneficial Occupancy of the project or at a designated phase of the project. In the event the Contractor accomplishes additional work after this submittal, which changes the as-built conditions, submit a new DVD with all drawing sheets and three blue-line copies of affected sheets which depict additional changes.

1.2.8. Title Blocks

In accordance with the configuration management plan, clearly mark title blocks to indicate final as-built drawings.

1.2.9. Other As-Built Documents

Provide scans of all other documents such as design analysis, catalog cuts, certification documents that are not available in native electronic format in an organized manner in Adobe.pdf format.

1.2.9.1. LEED Documentation

Update LEED documentation on at least a monthly basis and have it available for review by the Government on the jobsite at all times during construction. Submit the final LEED Project Checklist(s), final LEED submittals checklist and complete project documentation, verifying the final LEED score and establishing the final rating. Provide full support to the validation review process, including credit audits. See also the LEED documentation requirements in Section 01 33 16, DESIGN AFTER AWARD.

1.2.9.2. GIS Documentation

Provide final geo-referenced GIS database of the new building footprint along with any changes made to exterior of the building. The intent of capturing the final building footprint and exterior modifications in a GIS database is to provide the installation with a data set of the comprehensive changes made to the landscape as a result of the construction project. The Government will incorporate this data set into the installations existing GIS MasterPlan or Enterprise GIS system. The GIS database deliverable shall follow a standard template provided to the Contractor by the Government, adhere to detailed specifications outlined in ECB No 2006-15, and be documented using the Federal Geographic Data Committee (FGDC) metadata standard.

1.3. EQUIPMENT DATA

1.3.1. Real Property Equipment

Provide an Equipment-in-Place list of all installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. Include the cost of each piece of installed property F.O.B. construction site. For each of the items which is specified herein to be guaranteed for a specified period from the date of acceptance thereof, provide the following information: The name, serial and model number address of equipment supplier, or manufacturer originating the guaranteed item. The Contractor's guarantee to the Government of these items will not be limited by the terms of any manufacturer's guarantee to the Contractor. Furnish the list as one (1) reproducible and three (3) copies thirty (30) calendar days before completion of any segment of the contract work which has an incremental completion date.

1.3.2. Maintenance and Parts Data

Furnish a brochure, catalog cut, parts list, manufacturer's data sheet or other publication showing detailed parts data on all other equipment subject to repair and maintenance procedures not otherwise required in Operations and Maintenance Manuals specified elsewhere in this contract. Distribution of directives shall follow the same requirements as listed in paragraph above.

1.3.3. Construction Specifications

Furnish permanent electronic files of final as-built construction specifications, including modifications thereto, with the as-built drawings.

1.4. CONSTRUCTION WARRANTY MANAGEMENT

1.4.1. Prior to the end of the one year warranty, the Government may conduct an infrared roof survey on any project involving a membrane roofing system. This survey will be conducted in accordance with ASTM C1153-90, "Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging". The Contractor shall replace all damaged materials and locate and repair sources of moisture penetration.

1.4.2. Management

1.4.2.1. Warranty Management Plan

Develop a warranty management plan containing information relevant to the clause **Warranty of Construction** in FAR 52.246-21. Submit the warranty management plan for Government approval at least 30 days before the planned pre-warranty conference. In the event of phased turn-over of the contract, update the Warranty Management Plan as necessary to include latest information required. Include all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan shall be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below shall include due date and whether item has been submitted or was accomplished. Submit warranty information made available during the construction phase prior to each monthly pay estimate. Assemble information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period shall begin on the date of project acceptance and shall continue for the full product warranty period. The Contractor, Government, including the Customer Representative shall jointly conduct warranty inspections, 4 months and 9 months, after acceptance. The warranty management plan shall include, but shall not be limited to, the following information:

- (1) Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the contractors, subcontractors, manufacturers or suppliers involved.
- (2) Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.
- (3) A list for each warranted equipment, item, feature of construction or system indicating:
 - (i) Name of item.
 - (ii) Model and serial numbers.
 - (iii) Location where installed.
 - (iv) Name and phone numbers of manufacturers or suppliers.
 - (v) Names, addresses and telephone numbers of sources of spare parts.
 - (vi) Warranties and terms of warranty. Include one-year overall warranty of construction. Indicate those items, which have extended warranties with separate warranty expiration dates.
 - (vii) Cross-reference to warranty certificates as applicable.
 - (viii) Starting point and duration of warranty period.
 - (ix) Summary of maintenance procedures required to continue the warranty in force.
 - (x) Cross-reference to specific pertinent Operation and Maintenance manuals.
 - (xi) Organization, names and phone numbers of persons to call for warranty service.
 - (xii) Typical response time and repair time expected for various warranted equipment.
- (4) The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.
- (5) Procedure and status of tagging of all equipment covered by extended warranties.
- (6) Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.4.3. Performance Bond

1.4.3.1. The Contractor's Performance Bond will remain effective throughout the construction warranty period.

1.4.3.2. In the event the Contractor or his designated representative(s) fails to commence and diligently pursue any work required under this clause, and in a manner pursuant to the requirements thereof, the Government shall have

a right to demand that said work be performed under the Performance Bond by making written notice on the surety. If the surety fails or refuses to perform the obligation it assumed under the Performance Bond, the Government shall have the work performed by others, and after completion of the work, may make demand for reimbursement of any or all expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

1.4.3.3. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Government will have the right to recoup expenses from the bonding company.

1.4.3.4. Following oral or written notification of required warranty repair work, the Contractor will respond as dictated by para. 1.4.5. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Government to proceed against the Contractor as outlined in the paragraph 1.4.5.5 and/or above.

1.4.4. Pre-Warranty Conference

Prior to contract completion, or completion of any phase or portion of contract to be turned over, and at a time designated by the Contracting Officer, the Contractor shall meet with the Government to develop a mutual understanding with respect to the requirements of this clause. Communication procedures for Contractor notification of warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Government for the execution of the construction warranty shall be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, the Contractor will furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, will be continuously available, and will be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of his responsibilities in connection with other portions of this provision.

1.4.5. Contractor's Response to Warranty Service Requirements.

Following Government oral or written notification, which may include authorized installation maintenance personnel, the Contractor shall respond to warranty service requirements in accordance with the "Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. The report shall include the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and backcharge the construction warranty payment item established.

1.4.5.1. First Priority Code 1 Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

1.4.5.2. Second Priority Code 2 Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

1.4.5.3. Third Priority Code 3 All other work to be initiated within 3 work days and work continuously to completion or relief.

1.4.5.4. The "Warranty Service Priority List" is as follows:

- Code 1 - Air Conditioning System
 - (a) Buildings with computer equipment.
 - (b) Barracks, mess halls (entire building down).
- Code 2 - Air Conditioning Systems
 - (a) Recreational support.
 - (b) Air conditioning leak in part of building, if causing damage.
 - (c) Air conditioning system not cooling properly

- (d) Admin buildings with Automated Data Processing (ADP) equipment not on priority list.
 - Code 1 - Doors
- (a) Overhead doors not operational.
 - Code 1 - Electrical
- (a) Power failure (entire area or any building operational after 1600 hours).
- (b) Traffic control devices.
- (c) Security lights.
- (d) Smoke detectors and fire alarm systems
- (e) Power or lighting failure to an area, facility, portion of a facility, which may adversely impact health, safety, security, or the installation's mission requirement, or which may result in damage to property.
 - Code 2 - Electrical
- (a) Power failure (no power) for unoccupied buildings or portions thereof or branch circuits within occupied buildings, not listed as Code 1.
- (a) Receptacle and lights, not listed as code 1.
 - Code 3 - Electrical
- (a) Street, parking area lights
 - Code 1 - Gas
- (a) Leaks and breaks.
- (b) No gas to cantonment area.
 - Code 1 - Heat
- (a) Area power failure affecting heat.
- (b) Heater in unit not working.
 - Code 2 Heat
- (a) All heating system failures not listed as Code 1.
 - Code 3 - Interior
- (a) Floor damage
- (b) Paint chipping or peeling
 - Code 1 - Intrusion Detection Systems - N/A.
 - Code 2 - Intrusion Detection Systems other than those listed under Code 1
 - Code 1 - Kitchen Equipment
- (a) Dishwasher.
- (b) All other equipment hampering preparation of a meal.
 - Code 2 - Kitchen Equipment
- (a) All other equipment not listed under Code 1.
 - Code 2 - Plumbing
- (a) Flush valves not operating properly
- (b) Fixture drain, supply line commode, or water pipe leaking.
- (c) Commode leaking at base.
 - Code 3 - Plumbing
- (a) Leaking faucets

- Code 1 - Refrigeration
 - (a) Mess Hall.
 - (b) Medical storage.
- Code 2 - Refrigeration
 - (a) Mess hall - other than walk-in refrigerators and freezers.
- Code 1 - Roof Leaks
 - (a) Temporary repairs will be made where major damage to property is occurring.
- Code 2 - Roof Leaks
 - (a) Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.
- Code 1 - Sprinkler System
 - (a) All sprinkler systems, valves, manholes, deluge systems, and air systems to sprinklers.
- Code 1 - Tank Wash Racks (Bird Baths)
 - (a) All systems which prevent tank wash.
- Code 1 - Water (Exterior)
 - (a) Normal operation of water pump station.
- Code 2 - Water (Exterior)
 - (a) No water to facility.
- Code 1 - Water, Hot (and Steam)
 - (a) Barracks (entire building).
- Code 2 - Water, Hot
 - (a) No hot water in portion of building listed under Code 1

1.4.5.5. Should parts be required to complete the work and the parts are not immediately available, the Contractor shall have a maximum of 12 hours after arrival at the job site to provide the Government, with firm written proposals for emergency alternatives and temporary repairs for Government participation with the Contractor to provide emergency relief until the required parts are available on site for the Contractor to perform permanent warranty repair. The Contractor's proposals shall include a firm date and time that the required parts shall be available on site to complete the permanent warranty repair. The Government will evaluate the proposed alternatives and negotiate the alternative considered to be in the best interest of the Government to reduce the impact of the emergency condition. Alternatives considered by the Government will include the alternative for the Contractor to "Do Nothing" while waiting until the required parts are available to perform permanent warranty repair. Negotiating a proposal which will require Government participation and the expenditure of Government funds shall constitute a separate procurement action by the using service.

1.4.6. Equipment Warranty Identification Tags

1.4.6.1. Provide warranty identification tags at the time of installation and prior to substantial completion shall provide warranty identification tags on all Contractor and Government furnished equipment which the Contractor has installed.

- (a) The tags shall be suitable for interior and exterior locations, resistant to solvents, abrasion, and to fading caused by sunlight, precipitation, etc. These tags shall have a permanent pressure-sensitive adhesive back, and they shall be installed in a position that is easily (or most easily) noticeable. Tag each component of contractor furnished equipment that has differing warranties on its components.
- (b) Submit sample tags, representing how the other tags will look, for Government review and approval.
- (c) Tags for Warranted Equipment: The tag for this equipment shall be similar to the following: Exact format and size will be as approved.

EQUIPMENT WARRANTY - CONTRACTOR FURNISHED EQUIPMENT

MFG NAME

MODEL NO.

SERIAL NO.

CONTRACT NO.

CONTRACTOR NAME

CONTRACTOR WARRANTY EXPIRES

MFG WARRANTY(IES) EXPIRE

EQUIPMENT WARRANTY - GOVERNMENT FURNISHED EQUIPMENT

MFG NAME

MODEL NO.

SERIAL NO.

CONTRACT NO.

DATE EQUIP PLACED IN SERVICE

MFG WARRANTY(IES) EXPIRE

(d) If the manufacturer's name (MFG), model number and serial number are on the manufacturer's equipment data plate and this data plate is easily found and fully legible, this information need not be duplicated on the equipment warranty tag

1.4.6.2. Execution: Complete the required information on each tag and install these tags on the equipment by the time of and as a condition of final acceptance of the equipment.

1.5. MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING

Submit; all reports, statements, certificates, and completed checklists for testing, adjusting, balancing, and commissioning of mechanical systems prior to final inspection and transfer of the completed facility for approval, as specified in applicable technical specification sections.

1.6. OPERATION AND MAINTENANCE MANUALS

1.6.1. General Requirements

1.6.1.1. Inasmuch as the operations and maintenance manuals are required to operate and maintain the facility, the operations and maintenance (O&M) manuals will be considered a requirement prior to substantial completion of any facility to be turned over to the Government. Beneficial occupancy of all or portions of a facility prior to substantial completion will not relieve the Contractor of liquidated damages, if substantial completion exceeds the required completion date.

1.6.1.2. Provide one permanent electronic copy on CD-ROM and 2 hard copies of the Equipment Operating, Maintenance, and Repair Manuals. Provide separate manuals for each utility system as defined hereinafter. Submit Operations and Maintenance manuals for approval before field training or 90 days before substantial completion (whichever occurs earlier). If there is no separate CLIN for O&M Manuals, the Government will withhold an amount representing \$20,000, as non-progressed work, until submittal and approval of all O&M manuals are complete.

1.6.2. Definitions

1.6.2.1. Equipment

A single piece of equipment operating alone or in conjunction with other equipment to accomplish a system function.

1.6.2.2. System

A combination of one or more pieces of equipment which function together to accomplish an intended purpose (i.e. HVAC system is composed of many individual pieces of equipment such as fans, motors, compressors, valves, sensors, relays, etc.)

1.6.3. Hard Cover Binders

The manuals shall be hard cover with posts, or 3-ring binders, so sheets may be easily substituted. Print the following identification on the cover: the words "EQUIPMENT OPERATING, MAINTENANCE, AND REPAIR MANUALS," the project name, building number, and an indication of utility or systems covered, the name of the Contractor, and the Contract number. Manuals shall be approximately 8-1/2 by 11-inches with large sheets folded in and capable of being easily pulled out for reference. All manuals for the project must be similar in appearance, and be of professional quality.

1.6.4. Warning Page

Provide a warning page to warn of potential dangers (if they exist, such as high voltage, toxic chemicals, flammable liquids, explosive materials, carcinogens, high pressures, etc.). Place the warning page inside the front cover and in front of the title page. Include any necessary Material Safety Data Sheets (MSDS) here.

1.6.5. Title Page

The title page shall include the same information shown on the cover and show the name of the preparing firm and the date of publication.

1.6.6. Table of Contents

Each volume of the set of manuals for this project shall include a table of contents, for the entire set, broken down by volume.

1.6.7. GENERAL

Organize manuals according to the following format, and include information for each item of equipment. Submit a draft outline and table of contents for approval at 50% contract completion.

TABLE OF CONTENTS

PART I: Introduction

- Equipment Description
- Functional Description
- Installation Description

PART II: Operating Principles

PART III: Safety

PART IV: Preventive Maintenance

- Preventive Maintenance Checklist, Lubrication
- Charts and Diagrams

PART V: Spare Parts Lists

- Troubleshooting Guide
- Adjustments
- Common Repairs and Parts Replacement

PART VI: Illustrations

1.6.7.1. Part I-Introduction

Part I shall provide an introduction, equipment or system description, functional description and theory of operation, and installation instructions for each piece of equipment. Include complete instructions for uncrating, assembly, connection to the power source and pre-operating lubrication in the installation instructions as applicable. Illustrations, including wiring and cabling diagrams, are required as appropriate in this section. Include halftone pictures of the equipment in the introduction and equipment description, as well as system layout drawings with each item of equipment located and marked. Do not use copies of previously submitted shop drawings in these manuals.

1.6.7.2. Part II-Operating Principles

Part II shall provide complete instructions for operating the system, and each piece of equipment. Illustrations, halftone pictures, tables, charts, procedures, and diagrams are required when applicable. This will include step-by-step procedures for start-up and shutdown of both the system and each component piece of equipments, as well as adjustments required to obtain optimum equipment performance, and corrective actions for malfunctions. Show performance sheets and graphs showing capacity data, efficiencies, electrical characteristics, pressure drops, and flow rates here, also. Marked-up catalogs or catalog pages do not satisfy this requirement. Present performance information as concisely as possible with only data pertaining to equipment actually installed. Include actual test data collected for Contractor performance here.

1.6.7.3. Part III-Safety

Part III shall contain the general and specific safety requirements peculiar to each item of equipment. Repeat safety information as notes cautions and warnings in other sections where appropriate to operations described.

1.6.7.4. Part IV-Preventive Maintenance

Part IV shall contain a troubleshooting guide, including detailed instructions for all common adjustments and alignment procedures, including a detailed maintenance schedule. Also include a diagnostic chart showing symptoms and solutions to problems. Include test hookups to determine the cause, special tools and test equipment, and methods for returning the equipment to operating conditions. Information may be in chart form or in tabular format with appropriate headings. Include instructions for the removal, disassembly, repair, reassembly, and replacement of parts and assemblies where applicable and the task is not obvious.

1.6.7.5. Part V-Spare Parts List

Part V shall contain a tabulation of description data and parts location illustrations for all mechanical and electrical parts. The heading of the parts list shall clearly identify the supplier, purchase order number, and equipment. Include the unit price for each part. List parts by major assemblies, and arrange the listing in columnar form. Include names and addresses of the nearest manufacturer's representatives, as well as any special warranty information. Provide a list of spare parts that are recommended to be kept in stock by the Government installation.

1.6.7.6. Part VI-Illustrations

Part VI shall contain assembly drawings for the complete equipment or system and for all major components. Include complete wiring diagrams and schematics. Other illustrations, such as exploded views, block diagrams, and cutaway drawings, are required as appropriate.

1.6.8. Framed Instructions

Post framed instructions are required for substantial completion. Post framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, including equipment, ductwork, piping valves, dampers, and control sequence at a location near the equipment described. Prepare condensed operating instructions explaining preventive maintenance procedures methods of checking the system for normal safe operation, valve schedule and procedures for safely starting and stopping the system in type form, framed as specified above for the wiring and control diagrams and posted beside the diagrams. Submit proposed diagrams, instructions, and other sheets prior to posting. Post the framed instructions before field training.

1.6.9. (Reserved. See 1.7 for Field Training)

1.6.10. System/Equipment Requirements

1.6.10.1. Facility Heating System

Provide information on the following equipment: boilers, water treatment, chemical feed pumps and tanks, converters, heat exchangers, pumps, unit heaters, fin-tube radiation, air handling units (both heating only and heating and cooling), and valves (associated with heating systems).

1.6.10.2. Air-Conditioning Systems

Provide information in chillers, packaged air-conditioning equipment, towers, water treatment, chemical feed pumps and tanks, air-cooled condensers, pumps, compressors, air handling units, and valves (associated with air-conditioning systems).

1.6.10.3. Temperature Control and HVAC Distribution Systems

Provide all information described for the following equipment: valves, fans, air handling units, pumps, boilers, converters and heat exchangers, chillers, water cooled condensers, cooling towers, and fin-tube radiation, control air compressors, control components (sensors, controllers, adapters and actuators), and flow measuring equipment.

1.6.10.4. Central Heating Plants

Provide the information described for the following equipment: boilers, converters, heat exchangers, pumps, fans, steam traps, pollution control equipment, chemical feed equipment, control systems, fuel handling equipment, de-aerators, tanks (flash, expansion, return waters, etc.), water softeners, and valves.

1.6.10.5. Heating Distribution Systems

Provide the information described for the following equipment: valves, fans, pumps, converters and heat exchangers, steam traps, tanks (expansion, flash, etc.), and piping systems.

1.6.10.6. Exterior Electrical Systems

Provide information on the following equipment: power transformers, relays, reclosers, breakers, and capacitor bank controls.

1.6.10.7. Interior Electrical Systems

Provide information on the following equipment: relays, motor control centers, switchgear, solid state circuit breakers, motor controller, EPS lighting systems, wiring diagrams and troubleshooting flow chart on control systems, and special grounding systems.

1.6.10.8. Energy Monitoring and Control Systems

The maintenance manual shall include descriptions of maintenance for all equipment, including inspection, periodic preventative maintenance, fault diagnosis, and repair or replacement of defective components.

1.6.10.9. Domestic Water Systems

Provide the identified information on the following equipment: tanks, unit process equipment, pumps, motors, control and monitoring instrumentation, laboratory test equipment, chemical feeders, valves, switching gear, and automatic controls.

1.6.10.10. Wastewater Treatment Systems

Provide the identified information on the following equipment: tanks, unit process equipment, pumps, motors, control and monitoring instrumentations, laboratory test equipment chemical feeders, valves, scrapers, skimmers, comminutors, blowers, switching gear, and automatic controls.

1.6.10.11. Fire Protection Systems

Provide information on the following equipment: alarm valves, manual valves, regulators, foam and gas storage tanks, piping materials, sprinkler heads, nozzles, pumps, and pump drivers.

1.6.10.12. Fire Alarm and Detection Systems

- (1) The maintenance manual shall include description of maintenance for all equipment, including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
- (2) Provide all software; database with complete identification of programmable portions of system equipment and devices, and all other system programming data on all modes of the system; connecting cables; and proprietary equipment necessary for the operation, maintenance, testing, repair and programming, etc. of the system and that may be required for implementation of future changes to the fire system (additional and/or relocated initiating devices, notification devices, etc.
- (3) Provide all system and equipment technical data and computer software with the requisite rights to Government use, in accordance with the applicable contract clauses.
- (4) Training shall include software and programming required for the effective operation, maintenance, testing, diagnostics and expansion of the system.

1.6.10.13. Plumbing Systems

Provide information on the following equipment: water heaters, valves, pressure regulators backflow preventors, piping materials, and plumbing fixtures.

1.6.10.14. Liquid Fuels Systems

Provide information on the following equipment: tanks, automatic valves manual valves, filter separators, pumps, mechanical loading arms, nozzles, meters, electronic controls, electrical switch gear, and fluidic controls.

1.6.10.15. Cathodic Protection Systems

Provide information on the following material and equipment: rectifiers, meters, anodes, anode backfill, anode lead wire, insulation material and wire size, automatic controls (if any), rheostats, switches, fuses and circuit breakers, type and size of rectifying elements, type of oil in oil-immersed rectifiers, and rating of shunts.

1.6.10.16. Generator Installations

Provide information on the following equipment: generator sets, automatic transfer panels, governors, exciters, regulators starting systems, switchgear, and protective devices.

1.6.10.17. Miscellaneous Systems

Provide information on the following: communication and ADP systems, security and intrusion alarm, elevators, material handling, active solar, photovoltaic, nurse call, paging, intercom, closed circuit TV, irrigation, sound and material delivery systems, kitchen, refrigeration, disposal, ice making equipment, and other similar type special systems not otherwise specified.

1.6.10.18. Laboratory, Environmental and Pollution Control Systems

Provide information on the following equipment: wet scrubbers, quench chambers, scrub tanks, liquid oil separators, and fume hoods.

1.7. FIELD TRAINING

Field Training is a requirement for substantial completion. Conduct a training course for the operating staff for each particular system. Conduct the training is to be conducted during hours of normal working time after the system is functionally complete. The field instructions shall cover all of the items contained in the Equipment Operating, Maintenance and Repair Manuals. The training will include both classroom and "hands-on" training. Submit a lesson plan outlining the information to be discussed during training periods. Submit this lesson plan for approval 90 days before contract completion before the field training occurs. Record training on DVD and furnish to the Government within ten (10) days following training. Document all training and furnish a list of all attendees.

1.8. PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY

Promptly furnish and require any sub-contractor or supplier to furnish, in like manner, unit prices and descriptive data required by the Government for Property Record purposes of fixtures and equipment furnished and/or installed by the Contractor or sub-contractor, except prices do not need to be provided for Government-Furnished Property.

1.9. LEED REVIEW MEETINGS

1.9.1. Pre-Closeout Meeting. Approximately 30 days before submittal of LEED closeout documentation, the Contractor and the Government's project delivery team (including Installation representative) will meet to review the documentation, determine which, if any, credits will be audited and identify any corrections/missing items prior to the closeout LEED documentation submittal.

1.9.2. Approximately 14 days after submittal of LEED closeout documentation, the Contractor and the Government's project delivery team (including Installation representative) will meet to review the LEED closeout

documentation. The review conference will include discussion of and resolution of all review comments to ensure consensus on achievement of credits and satisfactory documentation. At the review conference a final score will be determined and endorsed in writing by all parties.

1.10. RED ZONE MEETING

At approximately 80% of contract completion or 60 days before the anticipated Beneficial Occupancy Date (BOD), whichever occurs first, the Contractor and the Government's project delivery team will conduct what is known as the Red Zone Meeting to discuss the close-out process, to schedule the events and review responsibilities for actions necessary to produce a timely physical, as well as fiscal, project close-out. The Red Zone meeting derives its name from the football term used to describe the team effort to move the ball the last 20 yards into the end zone. The close-out of a construction project sometimes can be equally as hard and most definitely requires the whole team's efforts. The ACO will chair the meeting. If not already provided, shortly before the meeting, the Contractor shall provide an electronic copy or access to the CADD as-built drawings, completed commensurate with the amount of work completed at the time of the Red Zone Meeting, as an indicator of the Contractors' understanding of and ability to meet the USACE CADD Standards and to ensure that the Contractor is making progress with CADD As-Built requirements. EXHIBIT 1 is a generic meeting checklist.

1.11. FINAL CLEANING

Clean the premises in accordance with FAR clause 52.236-12 and additional requirements stated here. Remove stains, foreign substances, and temporary labels from surfaces. Vacuum carpet and soft surfaces. Clean equipment and fixtures to a sanitary condition. Clean or replace filters of operating equipment if cleaning isn't possible or practicable. Remove debris from roofs, drainage systems, gutters, and downspouts. Sweep paved areas and rake clean landscaped areas. Remove waste, surplus materials, and rubbish from the site. Remove all temporary structures, barricades, project signs, fences and construction facilities. Submit a list of completed clean-up items on the day of final inspection.

1.12. INTERIM FORM DD1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete, update draft provided with the final design package(s) (see Section 01 33 16, paragraph 3.7.5) and submit an accounting of all installed property on Interim Form DD1354 "Transfer and Acceptance of Military Real Property." Include any additional assets/improvements/alterations and cost updates from the Draft DD Form 1354. Contact the COR for any project specific information necessary to complete the DD Form 1354. This form will be a topic for the Red Zone Meeting discussed above. For information purposes, a blank DD Form 1354 (fill-able) in ADOBE (PDF) may be obtained at the following web site: <http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1354.pdf> Submit the completed Checklist for Form DD1354 of Government-Furnished and Contractor-Furnished/Contractor Installed items. Attach this list to the updated DD Form 1354. Instructions for completing the form and a blank checklist (fill-able) in ADOBE (PDF) may be obtained at the following web site: http://www.wbdg.org/ccb/DOD/UFC/ufc_1_300_08.pdf

EXHIBIT 1

SAMPLE

Red Zone Meeting Checklist

Date: _____

Contract No.	
Description / Location	
Contractor	
Contracting Officer	

Action	Completion Milestone	√
Inspections		
Fire		
Safety		
Pre-final		
Mechanical Test & Balance		
Commissioning		
Landscaping Complete		
Erosion Control		
Beneficial Occupancy Date (BOD)		
Furniture Installation		
Comm Installation		
As-Built Drawings		
Provide all O&M manuals, tools, shop drawings, spare parts, etc. to customer		
Training of O&M Personnel		
Provide Warranty documents to Customer		
Contract completion		

Ribbon cutting		
Payroll Clearances		
DD Form 2626 - Construction Contractor Performance Evaluation		
DD Form 2631 – A-E Performance Rated after Construction		
Status of Pending Mods and REA's/Claims		
Final Payment Completed		
Release of Claims		
Return of Unobligated Funds		
Move Project from CIP to General Ledger		
Financial completion		

End of Section 01 78 02.00 10

**PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
WARRIOR IN TRANSITION (WIT)
FORT LEONARD WOOD, MISSOURI**

Project No. B5095020

August 13, 2009

Prepared for:

**DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
Kansas City, Missouri**

Prepared by:

Terracon
Springfield, Missouri

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August 13, 2009



Department of the Army
Kansas City District, Corps of Engineers
700 Federal Building
Kansas City, Missouri 64106-2896

Attention: Ms. Vera Murray
PHN: 816-389-3840

Regarding: Preliminary Geotechnical Engineering Report
Warrior in Transition (WIT)
Fort Leonard Wood, Missouri
Terracon Project Number: B5095020
IDIQ Contract No. W912DQ-09-D-1008

Dear Ms. Murray

Terracon Consultants, Inc. (Terracon) has completed the preliminary geotechnical engineering services for the above referenced project. This study was performed in general accordance with Task Number 0004 dated June 27, 2009. This report presents the findings of the subsurface exploration and provides preliminary geotechnical guidance concerning earthwork and the design of foundations for the proposed communication tower and accompanying equipment shelter.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.

A blue ink signature of Eric M. Hollabaugh.

Eric M. Hollabaugh, E.I.
Staff Professional
Geotechnical Services

A blue ink signature of Eric H. Lidholm.

Eric H. Lidholm, P.E.
Senior Principal
Missouri: E-23265



Enclosures
3xc: Above
1xc: File



**PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
WARRIOR IN TRANSITION (WIT)
FORT LEONARD WOOD, MISSOURI**

Project No. B5095020

August 13, 2009

INTRODUCTION

A preliminary subsurface exploration has been completed for the proposed Warrior in Transition (WIT) facility to be located immediately north and south of Third Street between Illinois Avenue and Nebraska Avenue in Fort Leonard Wood, Missouri. Four (4) borings, designated D-09-36 through D-09-39, were performed to depths of approximately 30 to 50 feet below the existing ground surface in the proposed building and pavement areas. A fifth boring, designated D-09-38(2) was performed to a depth of approximately 8 feet to obtain sufficient sample recovery to perform the desired laboratory testing. Logs of the borings along with a vicinity map and a boring location diagram are included in Appendix A of this report.

The purpose of this preliminary geotechnical engineering report is to describe the subsurface conditions encountered in the borings, evaluate the test data and provide preliminary geotechnical recommendations regarding earthwork and the design and construction of foundations, floor slabs, and pavements for the proposed project.

PROJECT DESCRIPTION

We understand this project will include the construction of three new buildings consisting of a headquarters building, a 48 room barracks, and a soldier family assistance center at Ft. Leonard Wood, Missouri, along with associated parking areas and access roads. Detailed loading information was not available at the time of this preliminary report.

Detailed site grading information was not available at the time of this report; however, we understand that approximately 30 feet of relief exists across the project site. We estimate that significant cuts and fills of up to about 15 to 18 feet may be required to achieve final grades.

SITE EXPLORATION PROCEDURES

Field Exploration

The boring locations were laid out on the site by Terracon personnel using a site plan provided by the client and available site features. Boring D-09-39 was offset approximately 9 feet to the north of the proposed location due to the presence of an existing underground water line. Boring D-09-38(2) was located approximately 8 feet north of Boring D-09-38. Distances were measured using a tape and right angles were estimated. Ground surface elevations are shown on the individual

**Preliminary Geotechnical Engineering Report
Warrior in Transition (WIT)
Fort Leonard Wood, Missouri
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boring logs in Appendix A and have been rounded to the nearest ½-foot. These elevations were measured in the field using a surveyor's level and grade rod and were referenced to the base of the fire hydrant located immediately north of Third Street approximately midway between Illinois Avenue and Nebraska Avenue as shown on the Boring Location Diagram included in Appendix A. This temporary benchmark was assigned an elevation of 100 feet. The locations and elevations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

Borings were drilled with a CME 550X ATV-mounted rotary drill rig. Continuous flight solid-stem augers, hollow-stem augers, and tri-cone rotary wash methods were used to advance the boreholes. Representative samples were obtained by the split-barrel sampling procedure. Samples of the material below auger refusal depth in Boring B-09-38 were obtained using an NQ-2 sized diamond bit core barrel.

In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound C.M.E. auto-hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N). This value is used to estimate the in-situ relative density of cohesionless soils and consistency of cohesive soils.

A CME automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report. The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification.

Field logs of each boring were prepared by a Terracon engineer. These logs included visual classifications of the materials encountered during drilling as well as an interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.

Laboratory Testing

Soil samples were tested in the laboratory to measure their natural water content and a calibrated hand penetrometer was used to estimate the approximate unconfined compressive strength of some samples. The calibrated hand penetrometer has been correlated with unconfined compression tests and provides a better estimate of soil consistency than visual examination alone. The test results are provided on the boring logs included in Appendix A.

**Preliminary Geotechnical Engineering Report
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The soil samples were classified in the laboratory based on visual observation, texture and plasticity. The descriptions of the soil and group symbols that are indicated on the boring logs are in general accordance with the General Notes and Unified Soil Classification System in Appendix B of this report. A brief description of this classification system is attached to this report. Selected samples were further classified using the results of Atterberg limit testing. The Atterberg limit test results are also provided on the boring logs.

The rock core samples were visually examined and classified in the laboratory. Percent recovery and rock quality designation (RQD) were calculated for these samples and are noted at their depths of occurrence on the boring log. RQD is the percent of total length cored consisting only of sound pieces at least 4 inches or more in length and is a measure of the integrity of the rock mass in-situ. Rock quality, in terms of RQD, can be generally be described as excellent (90%-100%), good (75%-90%), fair (50%-75%), poor (25%-50%) and very poor (<25%).

SITE AND SUBSURFACE CONDITIONS

The project site is located immediately north and south of Third Street between Illinois Avenue and Nebraska Avenue in Fort Leonard Wood, Missouri as shown on the Vicinity Map included in Appendix A. At the time of our field work, the surface at each boring location consisted of grass covered soil or gravel parking areas.

Geology

Based on the 2003 Geologic Map of Missouri, Missouri Department of Natural Resources, bedrock at this site consists primarily of the Roubidoux (Or) and, the underlying Gasconade (Og) formations. The Roubidoux formation is described as being comprised primarily of sandstone, sandy dolomite, dolomite, chert, sandy chert, and cherty dolomite. The Gasconade formation is described as being comprised primarily of coarsely-crystalline, cherty dolomite.

Solution features, including caves and sinkholes, are commonly present in these formations. Several sinkholes are known to exist within 1 mile of this project site. Their published locations are shown on the geologic map included in Appendix A.

It is difficult to predict future sinkhole activity. Site grading and drainage may alter site conditions and could possibly cause sinkholes in areas that have no history of this activity.

Several inactive faults are also indicated on the 2003 Geologic Map of Missouri, Missouri Department of Natural Resources. The nearest is approximately 7 miles west-southwest of this project site. In many cases, the fault zones contain fault gouge consisting of the parent rock material and shale which is typically weaker than the bedrock that contains no faults.

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Soil Conditions

Conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Based on the results of the borings, subsurface conditions on the project site can be generalized as follows:

Approximately one to two inches of topsoil was encountered from the surface in all borings except Boring D-09-37. The topsoil was brown, friable, and contained significant organic matter. Topsoil thickness should be expected to vary across the site. Boring D-09-37 encountered approximately 2 inches of gravel surfacing from the ground surface.

Underlying the topsoil in Boring D-09-36 was existing uncontrolled fill. Uncontrolled fill is material that has been placed without moisture and density control. Typically, this material can vary in composition, density, consistency, moisture, etc. The existing uncontrolled fill in Boring D-09-36 generally consisted of lean to fat clay and fat clay with varying amounts of sand, gravel, cobbles, and trace amounts of cinders and organic material. The existing uncontrolled fill extended to a depth in the boring of approximately 25 feet.

Underlying the existing uncontrolled fill in Boring D-09-36, and the surficial material in the remaining borings, was sandy lean clay, lean to fat clay, sandy lean to fat clay, sandy fat clay, gravelly fat clay, clayey sand, and sandy silt. The native soil was generally reddish brown, with varying amounts of brown, tan, and gray, contained varying amounts of sand, gravel, cobbles, and boulders, and was stiff to hard in consistency or very dense in relative density. Borings D-09-36, D-09-37, and D-09-39 were terminated within the native clay at their respective planned depths of 50 feet, 30 feet, and 30 feet, without encountering bedrock or achieving auger refusal.

Underlying the sandy fat clay in Boring D-09-38 was sandstone. The sandstone was red and white, contained gray chert and reddish brown fat clay, and was severely weathered and moderately hard. Boring D-09-38 was terminated within the severely weathered sandstone at the boring's planned depth of 40 feet.

Please refer to the individual boring logs included in Appendix A of this report for additional information regarding subsurface conditions encountered in the borings.

Groundwater Level Observations

The boreholes were observed while drilling and after completion for the presence and level of groundwater. Groundwater was not observed in the borings while drilling prior to the introduction of water to facilitate wash boring and coring, or for the short time the borings were allowed to remain open after drilling completion. However, this does not necessarily mean that the borings terminated above groundwater. Due to the low permeability of the soils encountered in the borings, a relatively

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long period of time may be necessary for the groundwater level to develop and stabilize in a borehole in these materials. Long term observations in piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels in materials of this type.

It should be recognized that fluctuations in groundwater levels may occur and perched groundwater can develop due to seasonal variations in the amount of rainfall, runoff, water levels in the nearby creek, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations and the occurrence of seasonally perched groundwater in the near surface soils and underlying bedrock should be considered when developing the design and construction plans for the project.

ANALYSES AND PRELIMINARY DESIGN PARAMETERS

Geotechnical Considerations

Existing uncontrolled fill material was encountered in Boring D-09-36 to a depth of about 25 feet below existing grade at the time of our field investigation. At the boring location the existing uncontrolled fill was comprised of lean to fat clay and fat clay with varying amounts of sand, gravel, cobbles, cinders, and organic material. Conditions can also vary between boring locations. We are not aware of testing for moisture and density control performed for the existing fill during placement. However, if this uncontrolled fill material was tested, we request a copy of the test results so they can be considered when developing design recommendations for this site.

In our opinion, support of the planned structure on or above existing fill involves risk. Existing uncontrolled fill that is tested at the time of construction to evaluate its extent and suitability could be left in place beneath the proposed structures; however, risk associated with construction on existing uncontrolled fill must be assumed by the owner. Foundations and floor slabs supported on or above existing uncontrolled fill material that has not been uniformly placed and compacted with strict moisture and density control may not perform predictably. The composition and amount of uncontrolled fill could vary significantly across the site. Special site preparation procedures due to the presence of existing fill may be required, as described in the **Earthwork** section of this report.

A geotechnical engineer should be retained to evaluate the bearing material for the foundations and floor slab subgrade soils. Subsurface conditions, as identified by the field and laboratory testing programs, have been reviewed and evaluated with respect to the proposed building plans known to us at this time.

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Terracon Project Number B5095020
August 13, 2009**



Performance of foundation systems depends on many factors including, but not limited to the depth of footings, amounts of cut or fill, bearing material, and foundation loads. Structural loads, final grades, and other design details should be provided when available. Although this report discusses design parameters, these parameters are preliminary. This preliminary report is not intended to be relied upon for final design.

Examination of the boring logs indicates a wide range of soil-moisture conditions are present at this site. Soil samples at various depths have moisture levels above, near, or below, their respective measured plastic limit. Soil with moisture levels above their measured plastic limit may be prone to rutting, pumping, and can develop into unstable subgrade conditions during general construction operations. Soil with moisture levels at or below their measured plastic limit should be further evaluated to determine their potential for swell which could adversely impact on-grade construction. The lean to fat clay and fat clay soils at this site are expected to be able to be excavated with conventional earth-moving equipment.

Highly plastic, fat clay soils are present on this site. Such soils are commonly referred to as "expansive" or "swelling" soils because they expand or swell as their moisture content increases. However, these soils also "contract" or "shrink" as their moisture level decreases. Footings, floor slabs and pavements supported on expansive soils will move upward and downward and such movements will result in distortion, possibly causing cracking or structural damage to the structure. Because of this, we recommend that additional laboratory testing be performed during the final geotechnical exploration to better evaluate the expansive nature of these soils.

Earthwork

Existing uncontrolled fill material was encountered in Boring D-09-36. We are not aware of any moisture and density control being performed at the time of fill placement. In the absence of any documentation, we can not know if the existing fill was uniformly placed and compacted. If the owner's risk tolerance is high, such that the owner is willing to accept the risks associated with potential post construction settlements of foundations and floor slabs, then additional tests could be conducted prior to the onset of site grading operations to further evaluate the existing uncontrolled fill. However, it is possible that unsuitable fill material could go undetected, even with the additional testing. Typically, if the owner's risk tolerance is low, then all existing uncontrolled fill is removed and replaced at the outset.

As a cost savings measure, and if the owner is willing to assume the risks of potential post construction settlement of foundations and potentially adverse slab-on-grade performance, consideration could be given to leaving the uncontrolled fill in place for support of foundations and slabs-on-grade. However, consideration could be given to at least partial removal and replacement of the uncontrolled fill below foundations and slabs-on-grade such that a minimum of 2 feet of new engineered fill is present below foundations and slabs. In addition, after

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stripping or after excavating to rough grade, and prior to placing new fill, the existing uncontrolled fill remaining in-place is often evaluated by a representative of the geotechnical engineer of record. This could include in-place field density tests, proofrolling, and test pits, as appropriate. Additional removal may need to be performed if unstable or unsuitable material is observed. This will provide for removal of at least part of the existing uncontrolled fill and provide some thickness of uniformly compacted material below the foundations and slabs.

Prior to placing any fill, all vegetation, topsoil, and any otherwise unsuitable material is typically removed from the construction areas. Wet or dry material can be removed or moisture conditioned and re-compacted. After stripping and grubbing, the exposed subgrade is typically proof-rolled where possible to aid in locating loose or soft areas. Proofrolling is usually performed with a loaded tandem axle dump truck and soft, dry or low-density soil is removed or compacted in place prior to placing fill.

Unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. The contractor should be prepared to handle potentially wet, soft conditions. The use of light or remotely operated construction equipment, such as a backhoe or track-hoe, would aid in performing cuts and reducing subgrade disturbance. Should unstable subgrade conditions develop, stabilization measures may need to be employed. Specific stabilization methods can be provided during construction as the subgrade conditions are exposed.

Generally controlled, compacted fill consists of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the geotechnical engineer for evaluation. In general, low plasticity cohesive soil or granular soil having at least 18% low plasticity fines should be used for fill. The liquid limit of low plasticity fill is typically less than 50 and the plasticity index should be less than 22.

Controlled, compacted fill is generally placed in lifts of 9 inches or less in loose thickness when heavy, self-propelled compaction equipment is used and 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used. Controlled, compacted fill is generally compacted to at least 95% of the material's maximum standard Proctor dry density (ASTM D 698). The moisture content of clay fill is typically within the range of optimum moisture content to 4% above the optimum moisture content value as determined by the standard Proctor test at the time of placement and compaction.

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Generally, cohesionless fill material should be uniformly compacted to at least 95 percent of the standard Proctor maximum dry density at workable moisture levels. Moisture levels are typically maintained low enough to allow for satisfactory compaction to be achieved without the cohesionless fill material pumping when proofrolled.

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proof-rolling; placement and compaction of controlled compacted fills; backfilling of excavations into the completed subgrade, and just prior to construction of building floor slabs.

Foundations

The on-site native clay soils encountered in the borings appear generally suitable for support of foundations. Shallow foundations could be used to support lightly loaded structures provided the footings are supported by suitable material. Depending on the design footing elevation and bearing material, bearing pressures in the range of 1,500 psf to 3,000 psf may be possible on soil. Higher bearing pressures can be achieved on bedrock. Shallow foundations could be supported on suitable native clay soils or new controlled, compacted fill which has been properly placed and compacted as described in the **Earthwork** section of this report.

Remedial measures are expected to be performed on the uncontrolled fill prior to construction of structures on this material. We anticipate that remedial measures could include the use of aggregate piers, complete removal and replacement of the uncontrolled fill, or partial removal and replacement of the uncontrolled fill. Other foundation support methods may also be considered if the uncontrolled fill is to remain in place, such as deep foundations.

We recommend a geotechnical engineer be retained to perform further subsurface exploration during the design stage and to observe and test foundation bearing materials at the time of construction.

Floor Slab and Pavement Subgrades

Because of the moderate to high shrink-swell potential of some of the clay soils encountered in the borings, a low volume change layer would typically be developed below floor slabs on grade. This layer can vary from 12 to 36 inches in thickness. The low volume change layer usually consists of lean clay soil (i.e. low plasticity fill as described in the **Earthwork** section of this report) or a granular material such as sand, gravel or crushed stone. Lean to fat clay soils and fat clay soils, similar to those encountered in our borings performed at this site, are not typically suitable for use as low volume change material. Further testing at the individual building locations is often performed to verify the existence of suitable material. The low volume change zone would not be mandatory below pavements, but some improvement of pavement subgrade soils may be

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necessary. This can be accomplished with overexcavation and replacement or by amending them with Class C fly ash or hydrated lime.

Seismicity

The 2006 International Building Code (IBC) requires structural design to be in accordance with the appropriate seismic site classifications based upon subsurface rock and soil conditions. Based upon previous nearby projects, and the nature of the subsurface materials encountered in our borings, a Site Class C or D could possibly be used for seismic evaluation in accordance with the 2006 *International Building Code*, Table 1613.5.2.

Please note that the IBC Site Class is based on the characteristics of the upper 100 feet of the subsurface profile. Our borings extended to a maximum depth of 50 feet. Additional or deeper soil borings, or a geophysical exploration, could be performed in an attempt to justify a higher seismic site class.

Additional Considerations

Many of the clays in this locale have the potential to increase or decrease in volume with variations in moisture content. Materials having high plasticity characteristics (i.e., fat clay) generally have a greater potential for moisture related volume change than less plastic materials such as lean clay. However, even low plasticity soils can swell significantly if their moisture levels are initially low. Expansive subgrades are typically maintained in a relatively moist condition until floor slabs are constructed.

Adequate grading and drainage around the perimeter foundation systems to prevent ponding of water is important. Gutters and downspouts that drain water a minimum of 10 feet beyond the footprint of the proposed structures can be accomplished through the use of splash-blocks, downspout extensions, and flexible pipes that are designed to attach to the end of the downspout. Flexible pipe could be used if it is daylighted in such a manner that it gravity-drains collected water. Splash-blocks could also be considered below hose bibs and water spigots.

Utility trenches are a common source of water infiltration and migration. Consideration could be given to constructing an effective clay "trench plug" that extends at least 5 feet out from the face of the building exterior. The clay plug material generally consists of clay compacted at a water content at or above the soil's optimum water content.

GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our preliminary geotechnical recommendations in the design and specifications. Terracon also should be retained to provide

**Preliminary Geotechnical Engineering Report
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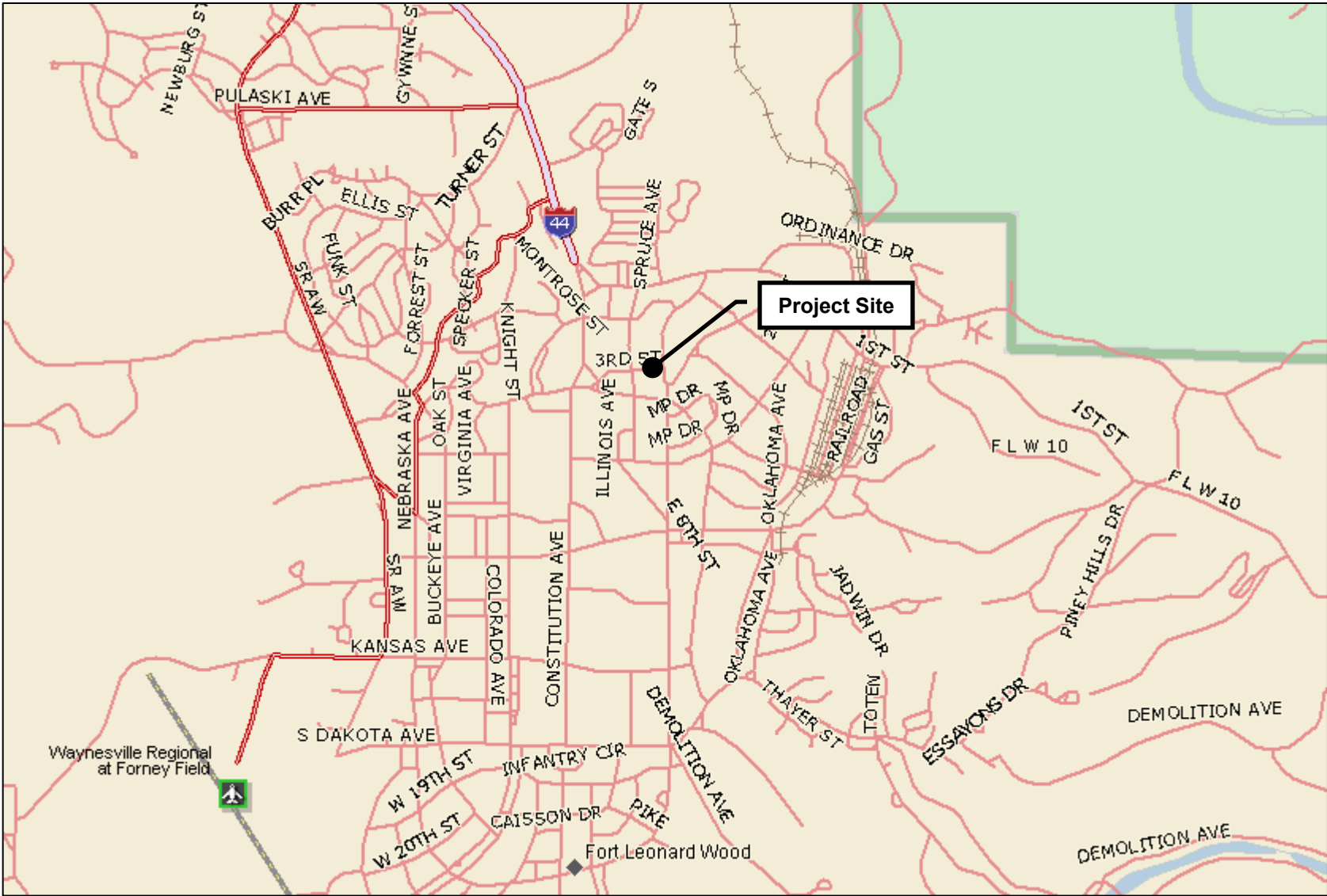


testing and observation during excavation, grading, foundation and construction phases of the project.

The analysis and preliminary recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of weather or construction. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.



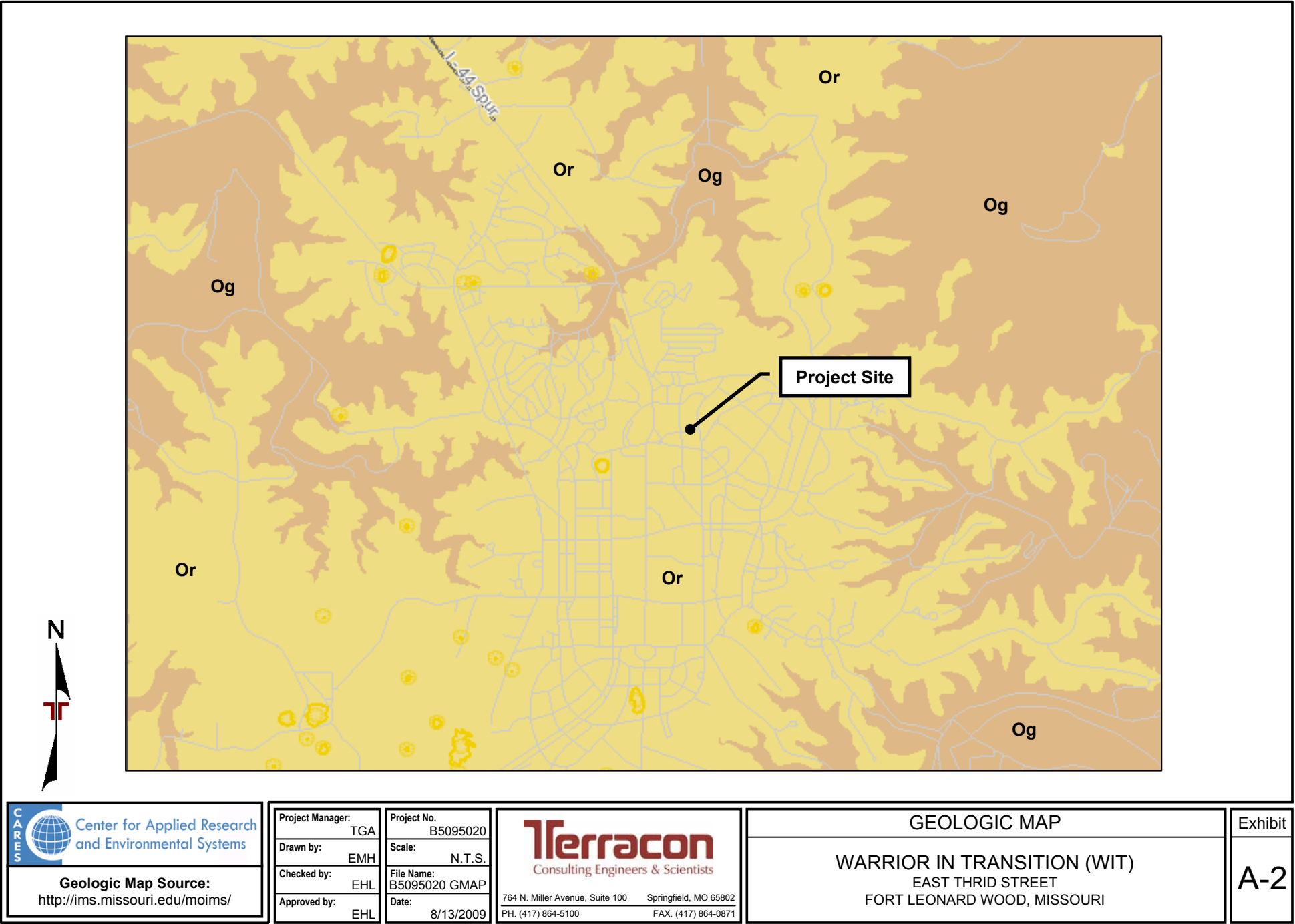
Project Manager:	TGA	Project No.	B5095020
Drawn by:	EMH	Scale:	N.T.S.
Checked by:	EHL	File Name:	B5095020 VMAP
Approved by:	EHL	Date:	8/13/2009

Terracon
Consulting Engineers & Scientists

764 N. Miller Avenue, Suite 100 Springfield, MO 65802
PH. (417) 864-5100 FAX. (417) 864-0871

VICINITY MAP
WARRIOR IN TRANSITION (WIT) EAST THRID STREET FORT LEONARD WOOD, MISSOURI

Exhibit
A-1



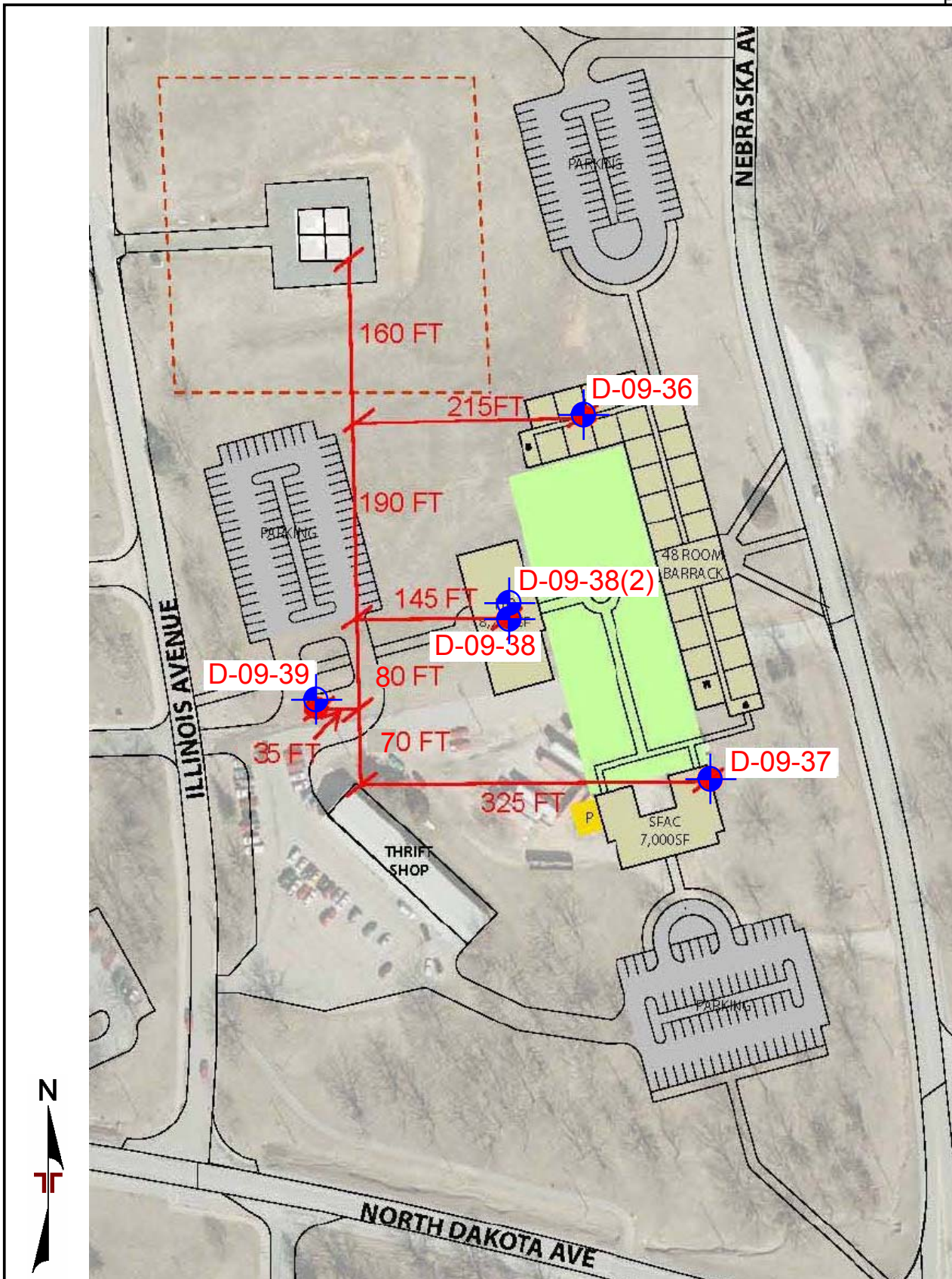


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT
INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	TGA
Drawn by:	EMH
Checked by:	EHL
Approved by:	EHL
Project No.	B5095020
Scale:	N.T.S
File Name:	B5095020BPLAN
Date:	8/13/2009

Terracon
Consulting Engineers & Scientists
764 N. Miller Avenue, Suite 100 Springfield, MO 65802
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BORING LOCATION DIAGRAM

WARRIOR IN TRANSITION (WIT)
EAST THIRD STREET
FORT LEONARD WOOD, MISSOURI


FIG No.

A-3

Friday, June 25, 2010

LOG OF BORING NO. D-09-36

Page 1 of 9

CLIENT					ARCHITECT / ENGINEER									
SITE					PROJECT									
Department of the Army East Third Street Fort Leonard Wood, Missouri					Warrior in Transition (WIT)									
GRAPHIC LOG	DESCRIPTION				DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
							NUMBER	TYPE	RECOVERY, in.	SPT - N** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTEBERG LIMITS (LL, PL, PI)
	Approximate Surface Elevation: 121.5 ft													
	0.1' 1" TOPSOIL 121.4'													
	UNCONTROLLED FILL: fat clay, reddish brown, with gravel													
						1	SS	14	11	19		5000*	40, 17, 23	
				5										
						2	SS	16	14	17			45, 14, 31	
-: with brown -: gravelly														
Continued Next Page														

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer
**CME 140H SPT automatic hammer





WATER LEVEL OBSERVATIONS, ft			
WL	 NONE	WS	 NONE 1 Hr AB
WL			



EXHIBIT A-4

Terracon

BORING STARTED		7-20-09	
BORING COMPLETED		7-20-09	
RIG	CME 550X	FOREMAN	SB
APPROVED	EMH	JOB #	B5095020

Friday, June 25, 2010







BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

LOG OF BORING NO. D-09-36												Page 2 of 9
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
	-: trace gray and white, trace cinders, possible cobbles			3	SS	18	15	15		4000*	34, 14, 20	
	-: with sand	10		4	SS	15	16	20			53, 17, 36	
				5	SS	18	15	13		4500*	45, 19, 26	
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft						BORING STARTED 7-20-09						
WL	▽ NONE	WS	▽ NONE 1 Hr AB			BORING COMPLETED 7-20-09						
WL	▽		▽			RIG CME 550X		FOREMAN SB				
EXHIBIT A-4						APPROVED EMH		JOB # B5095020				



LOG OF BORING NO. D-09-36												Page 3 of 9
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
	-	15		6	SS	20	12	13			37, 15, 22	
					WB							
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft						BORING STARTED 7-20-09						
WL	▽ NONE	WS	▽ NONE 1 Hr AB	Terracon				BORING COMPLETED 7-20-09				
WL	▽		▽					RIG CME 550X FOREMAN SB				
EXHIBIT A-4						APPROVED EMH JOB # B5095020						



LOG OF BORING NO. D-09-36												Page 4 of 9
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
<div></div>		<div>20</div>										
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft				<div>Terracon</div>				BORING STARTED 7-20-09				
WL	None	WS	None 1 Hr AB					BORING COMPLETED 7-20-09				
WL								RIG CME 550X FOREMAN SB				
EXHIBIT A-4								APPROVED EMH JOB # B5095020				



BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09







LOG OF BORING NO. D-09-36												Page 5 of 9
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
	25 <u>LEAN TO FAT CLAY:</u> brown, with sand and gravel 96.5	25										
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft								BORING STARTED 7-20-09				
WL  NONE WS  NONE 1 Hr AB								BORING COMPLETED 7-20-09				
WL  								RIG CME 550X FOREMAN SB				
EXHIBIT A-4								APPROVED EMH JOB # B5095020				

BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

LOG OF BORING NO. D-09-36												Page 6 of 9
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SAMPLES			TESTS		
							SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
												
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft						BORING STARTED 7-20-09						
WL	▽ NONE	WS	▽ NONE 1 Hr AB			BORING COMPLETED 7-20-09						
WL	▽		▽			RIG CME 550X		FOREMAN SB				
EXHIBIT A-4						APPROVED EMH		JOB # B5095020				

LOG OF BORING NO. D-09-36												Page 7 of 9
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
	-: with cobbles, boulders, and weathered bedrock	40										
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft								BORING STARTED 7-20-09				
WL ▽ NONE WS ▽ NONE 1 Hr AB								BORING COMPLETED 7-20-09				
WL ▽ ▽								RIG CME 550X FOREMAN SB				
EXHIBIT A-4								APPROVED EMH JOB # B5095020				


LOG OF BORING NO. D-09-36												Page 8 of 9
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SAMPLES			TESTS		
							SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
		45										
	Continued Next Page											
	The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.											
	*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer											
	WATER LEVEL OBSERVATIONS, ft						BORING STARTED 7-20-09					
	WL	∇ NONE	WS	∇ NONE 1 Hr AB			BORING COMPLETED 7-20-09					
	WL	∇		∇			RIG CME 550X		FOREMAN SB			
	EXHIBIT A-4						APPROVED EMH		JOB # B5095020			

LOG OF BORING NO. D-09-36													Page 9 of 9
CLIENT Department of the Army					ARCHITECT / ENGINEER								
SITE East Third Street Fort Leonard Wood, Missouri					PROJECT Warrior in Transition (WIT)								
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SAMPLES			TESTS			
							SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)		
	50	71.5	50										
	BOTTOM OF BORING AT 50 FEET NO REFUSAL												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.													
*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer													
WATER LEVEL OBSERVATIONS, ft									BORING STARTED 7-20-09				
WL  NONE WS  NONE 1 Hr AB									BORING COMPLETED 7-20-09				
WL  									RIG CME 550X FOREMAN SB				
EXHIBIT A-4									APPROVED EMH JOB # B5095020				

BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

LOG OF BORING NO. D-09-37

Page 1 of 5

CLIENT					ARCHITECT / ENGINEER									
SITE					PROJECT									
Department of the Army East Third Street Fort Leonard Wood, Missouri					Warrior in Transition (WIT)									
GRAPHIC LOG	DESCRIPTION				DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
							NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)
	Approximate Surface Elevation: 99.3 ft													
	0.2	2" GRAVEL SURFACING			99.1			PA						
	SANDY FAT CLAY: brown, with gravel, very stiff													
-: reddish brown, trace tan					CH	1	SS	24	23	27		7000*	59, 23, 36	
				5										
					CH	2	SS	24	30	16		5000*	50, 20, 30	
Continued Next Page														

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer
**CME 140H SPT automatic hammer





WATER LEVEL OBSERVATIONS, ft			
WL	 NONE	WS	 NONE 1 Hr AB
WL			

EXHIBIT A-5

Terracon

BORING STARTED		7-21-09	
BORING COMPLETED		7-21-09	
RIG	CME 550X	FOREMAN	SB
APPROVED	EMH	JOB #	B5095020

Friday, June 25, 2010

BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

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Continued Next Page

*Calibrated Hand Penetrometer
**CME 140H SPT automatic hammer

BORING STARTED		7-21-09	
BORING COMPLETED		7-21-09	
RIG	CME 550X	FOREMAN	SB
APPROVED	EMH	JOB #	B5095020

Friday, June 25, 2010

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Continued Next Page


*Calibrated Hand Penetrometer
**CME 140H SPT automatic hammer

BORING STARTED		7-21-09	
BORING COMPLETED		7-21-09	
RIG	CME 550X	FOREMAN	SB
APPROVED	EMH	JOB #	B5095020

EXHIBIT A-5

Friday, June 25, 2010

LOG OF BORING NO. D-09-37												Page 4 of 5
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
		20										
-: with cobbles, boulders, and weathered rock												
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft						BORING STARTED 7-21-09						
WL	▽ NONE	WS	▽ NONE 1 Hr AB					BORING COMPLETED 7-21-09				
WL	▽		▽					RIG CME 550X FOREMAN SB				
EXHIBIT A-5								APPROVED EMH JOB # B5095020				

LOG OF BORING NO. D-09-37												Page 5 of 5
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
		25										
		30										
BOTTOM OF BORING AT 30 FEET NO REFUSAL												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft						BORING STARTED 7-21-09						
WL	▽ NONE	WS	▽ NONE 1 Hr AB	Terracon				BORING COMPLETED 7-21-09				
WL	▽		▽					RIG CME 550X FOREMAN SB				
EXHIBIT A-5						APPROVED EMH JOB # B5095020						

LOG OF BORING NO. D-09-38

Page 1 of 7

CLIENT Department of the Army		ARCHITECT / ENGINEER									
SITE East Third Street Fort Leonard Wood, Missouri		PROJECT Warrior in Transition (WIT)									
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)
	Approximate Surface Elevation: 101.5 ft										
	0.3 101.2 <u>3" TOPSOIL</u>				PA						
	<u>LEAN TO FAT CLAY</u> : brown, trace gray, with sand and gravel, stiff										
	4 97.5 <u>SANDY SILT</u> : reddish brown, trace yellow, with fat clay, chert gravel, and sandstone zones, stiff			1	SS	20		18		2500*	25, 22, 3
	5.3 96.2 <u>COBBLES AND BOULDERS</u> Note: Not enough fines to test: See D-09-38(2) for test results.			2	SS WB	1		4			
Continued Next Page											

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer

**CME 140H SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ NONE	WS	▽ NONE 1 Hr AB
WL	▽		▽

EXHIBIT A-6

Terracon

BORING STARTED		7-20-09	
BORING COMPLETED		7-20-09	
RIG	CME 550X	FOREMAN	SB
APPROVED	EMH	JOB #	B5095020

Friday, June 25, 2010

BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

LOG OF BORING NO. D-09-38

Page 2 of 7

[illegible]

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer
**CME 140H SPT automatic hammer





WATER LEVEL OBSERVATIONS, ft			
WL	 NONE	WS	 NONE 1 Hr AB
WL			







EXHIBIT A-6

Terracon



BORING STARTED		7-20-09	
BORING COMPLETED		7-20-09	
RIG	CME 550X	FOREMAN	SB
APPROVED	EMH	JOB #	B5095020

Friday, June 25, 2010

BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

LOG OF BORING NO. D-09-38												Page 3 of 7
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
	-: with cobbles and possible boulders to approximately 18 feet	15		6	DB	0%	RQD 0%					
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft								BORING STARTED 7-20-09				
WL  NONE WS  NONE 1 Hr AB								BORING COMPLETED 7-20-09				
WL  WS 								RIG CME 550X FOREMAN SB				
EXHIBIT A-6								APPROVED EMH JOB # B5095020				




BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

LOG OF BORING NO. D-09-38												Page 4 of 7
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
		20		7	DB	0%	RQD 0%					
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft						BORING STARTED 7-20-09						
WL	▽ NONE	WS	▽ NONE 1 Hr AB			BORING COMPLETED 7-20-09						
WL	▽		▽			RIG CME 550X		FOREMAN SB				
EXHIBIT A-6						APPROVED EMH		JOB # B5095020				

BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

LOG OF BORING NO. D-09-38

Page 5 of 7

CLIENT					ARCHITECT / ENGINEER									
SITE					PROJECT									
Department of the Army					Warrior in Transition (WIT)									
East Third Street														
Fort Leonard Wood, Missouri														
GRAPHIC LOG	DESCRIPTION				DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
							NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTEBERG LIMITS (LL, PL, PI)
	25				25		8	DB	40%	RQD 7%				
	76.5													
	SANDSTONE***: red and white, with gray chert and reddish brown fat clay, severely weathered, moderately hard													
					30		9	DB	27%	RQD 0%				
Continued Next Page														

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

*Calibrated Hand Penetrometer
**CME 140H SPT automatic hammer





WATER LEVEL OBSERVATIONS, ft			
WL	 NONE	WS	 NONE 1 Hr AB
WL			







EXHIBIT A-6

Terracon

BORING STARTED		7-20-09	
BORING COMPLETED		7-20-09	
RIG	CME 550X	FOREMAN	SB
APPROVED	EMH	JOB #	B5095020

Friday, June 25, 2010

BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

LOG OF BORING NO. D-09-38												Page 7 of 7	
CLIENT Department of the Army						ARCHITECT / ENGINEER							
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)							
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS					
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)		
													
	40	61.5	40										
	BOTTOM OF BORING AT 40 FEET												
	***Classifications and stratigraphic boundaries estimated from visual observations of core samples. Petrographic and fossil analysis may reveal other rock types and stratigraphic classifications.												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer	
WATER LEVEL OBSERVATIONS, ft								BORING STARTED 7-20-09					
WL		NONE	WS						NONE 1 Hr AB	BORING COMPLETED 7-20-09			
WL										RIG	CME 550X	FOREMAN	SB
EXHIBIT A-6								APPROVED	EMH	JOB #	B5095020		

BOREHOLEW FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

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Continued Next Page



*Calibrated Hand Penetrometer
**CME 140H SPT automatic hammer

BORING STARTED		7-21-09	
BORING COMPLETED		7-21-09	
RIG	CME 550X	FOREMAN	SB
APPROVED	EMH	JOB #	B5095020

EXHIBIT A-7

Friday, June 25, 2010

BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

LOG OF BORING NO. D-09-38(2)												Page 2 of 2
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SAMPLES			TESTS		
							SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
												
8		93.5										
	BOTTOM OF BORING AT 8 FEET NO REFUSAL											
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft						BORING STARTED 7-21-09						
WL	▽ NONE	WS	▽ NONE 1 Hr AB			BORING COMPLETED 7-21-09						
WL	▽		▽			RIG CME 550X			FOREMAN SB			
EXHIBIT A-7						APPROVED EMH			JOB # B5095020			



BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09



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Continued Next Page



**CME 140H SPT automatic hammer

Terracon

LOG OF BORING NO. D-09-39												Page 2 of 5
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
	SANDY LEAN CLAY: reddish brown and tan, trace gray, with gravel	8										
	SANDY FAT CLAY: reddish brown, with tan and gray, trace gravel, hard	85.1	CH	3	SS	24	21	15		9000*	59, 19, 40	
		10	CH	4	SS	24	35	18		9000*	63, 23, 40	
	-: with gravel		CH	5	SS	24	27	16		9000*	52, 19, 33	
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft						BORING STARTED 7-21-09						
WL	▽ NONE	WS	▽ NONE 1 Hr AB	Terracon				BORING COMPLETED 7-21-09				
WL	▽		▽					RIG CME 550X FOREMAN SB				
EXHIBIT A-8								APPROVED EMH JOB # B5095020				

LOG OF BORING NO. D-09-39												Page 3 of 5
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SAMPLES			TESTS		
							SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
		15			PA							
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft						BORING STARTED 7-21-09						
WL	∇ NONE	WS	∇ NONE 1 Hr AB			BORING COMPLETED 7-21-09						
WL	∇		∇			RIG CME 550X		FOREMAN SB				
EXHIBIT A-8						APPROVED EMH		JOB # B5095020				

BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

LOG OF BORING NO. D-09-39												Page 4 of 5
CLIENT Department of the Army						ARCHITECT / ENGINEER						
SITE East Third Street Fort Leonard Wood, Missouri						PROJECT Warrior in Transition (WIT)						
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS				
				NUMBER	TYPE	RECOVERY, in.	SPT - N ** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	ATTERBERG LIMITS (LL, PL, PI)	
	-: with cobbles, possible boulders	20										
Continued Next Page												
The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.												*Calibrated Hand Penetrometer **CME 140H SPT automatic hammer
WATER LEVEL OBSERVATIONS, ft								BORING STARTED 7-21-09				
WL ▽ NONE WS ▽ NONE 1 Hr AB								BORING COMPLETED 7-21-09				
WL ▽ ▽								RIG CME 550X FOREMAN SB				
EXHIBIT A-8								APPROVED EMH JOB # B5095020				

BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

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BOREHOLE W FIGURE NO B5095020.GPJ GINT 001.GDT 8/13/09

*Calibrated Hand Penetrometer
**CME 140H SPT automatic hammer

BORING STARTED		7-21-09	
BORING COMPLETED		7-21-09	
RIG	CME 550X	FOREMAN	SB
APPROVED	EMH	JOB #	B5095020

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS: Split Spoon – 1-³/₈" I.D., 2" O.D., unless otherwise noted
 ST: Thin-Walled Tube - 2" O.D., unless otherwise noted
 RS: Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted
 DB: Diamond Bit Coring - 4", N, B
 BS: Bulk Sample or Auger Sample

HS: Hollow Stem Auger
 PA: Power Auger
 HA: Hand Auger
 RB: Rock Bit
 WB: Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL: Water Level WS: While Sampling N/E: Not Encountered
 WCI: Wet Cave in WD: While Drilling
 DCI: Dry Cave in BCR: Before Casing Removal
 AB: After Boring ACR: After Casing Removal

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

<u>Unconfined Compressive Strength, Qu, psf</u>	<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Consistency</u>
< 500	0 – 1	Very Soft
500 – 1,000	2 – 4	Soft
1,001 – 2,000	4 – 8	Medium Stiff
2,001 – 4,000	8 – 15	Stiff
4,001 – 8,000	15 – 30	Very Stiff
8,000+	> 30	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Relative Density</u>
0 – 3	Very Loose
4 – 9	Loose
10 – 29	Medium Dense
30 – 49	Dense
> 50	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other Constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 – 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

<u>Major Component of Sample</u>	<u>Particle Size</u>
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other Constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 – 12
Modifiers	> 12

PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1 – 10
Medium	11 – 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests^A

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A					Soil Classification	
					Group Symbol	Group Name ^B
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels	Cu ≥ 4 and 1 ≤ Cc ≤ 3 ^E		GW	Well-graded gravel ^F
		Less than 5% fines ^C	Cu < 4 and/or 1 > Cc > 3 ^E		GP	Poorly graded gravel ^F
		Gravels with Fines	Fines classify as ML or MH		GM	Silty gravel ^{F,G,H}
		More than 12% fines ^C	Fines classify as CL or CH		GC	Clayey gravel ^{F,G,H}
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands	Cu ≥ 6 and 1 ≤ Cc ≤ 3 ^E		SW	Well-graded sand ^I
		Less than 5% fines ^D	Cu < 6 and/or 1 > Cc > 3 ^E		SP	Poorly graded sand ^I
		Sands with Fines	Fines classify as ML or MH		SM	Silty sand ^{G,H,I}
		More than 12% fines ^D	Fines classify as CL or CH		SC	Clayey sand ^{G,H,I}
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above “A” line ^J		CL	Lean clay ^{K,L,M}
			PI < 4 or plots below “A” line ^J		ML	Silt ^{K,L,M}
		organic	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K,L,M,N}
			Liquid limit - not dried		Organic silt ^{K,L,M,O}	
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above “A” line		CH	Fat clay ^{K,L,M}
			PI plots below “A” line		MH	Elastic Silt ^{K,L,M}
		organic	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K,L,M,P}
			Liquid limit - not dried		Organic silt ^{K,L,M,Q}	
Highly organic soils		Primarily organic matter, dark in color, and organic odor			PT	Peat

^A Based on the material passing the 3-in. (75-mm) sieve

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

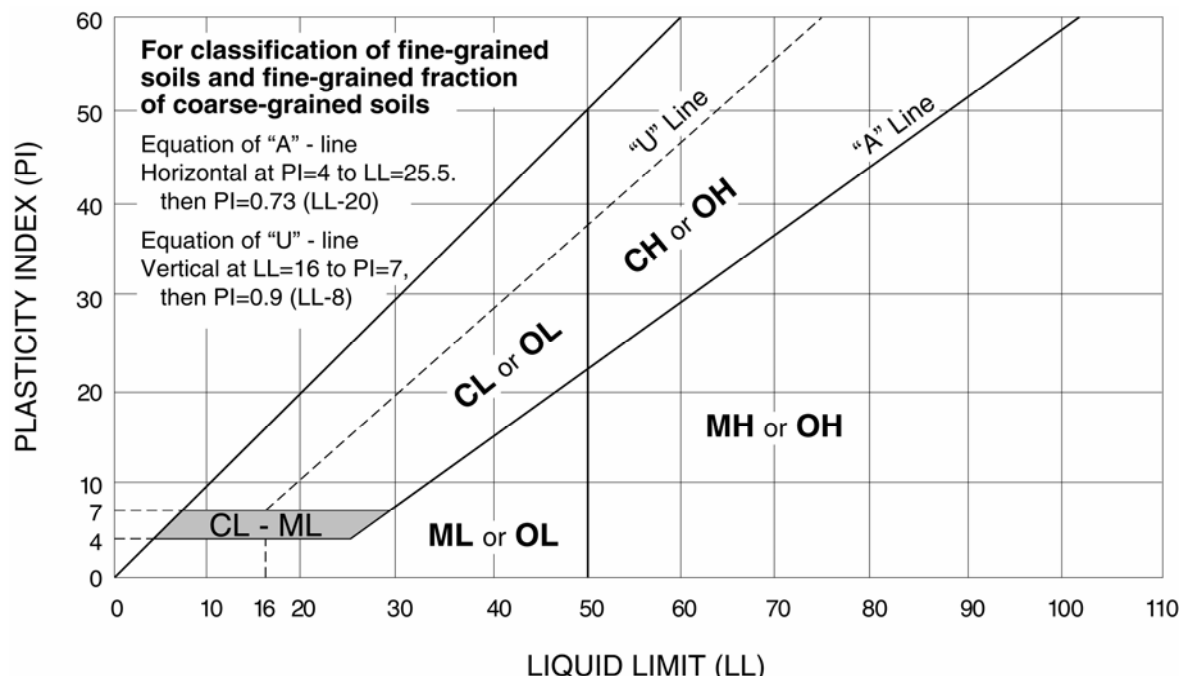
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



GENERAL NOTES

Description of Rock Properties

WEATHERING

Fresh	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer if crystalline.
Very slight	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
Slight	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 in. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.
Moderate	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.
Moderately severe	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick.
Severe	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
Very severe	All rock except quartz discolored or stained. Rock "fabric" discernible, but mass effectively reduced to "soil" with only fragments of strong rock remaining.
Complete	Rock reduced to "soil". Rock "fabric" not discernible or discernible only in small, scattered locations. Quartz may be present as dikes or stringers.

HARDNESS (for engineering description of rock – not to be confused with Moh's scale for minerals)

Very hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
Moderately hard	Can be scratched with knife or pick. Gouges or grooves to ¼ in. deep can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 in. deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1-in. maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1-in. or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

Joint, Bedding and Foliation Spacing in Rock ^a

Spacing	Joints	Bedding/Foliation
Less than 2 in.	Very close	Very thin
2 in. – 1 ft.	Close	Thin
1 ft. – 3 ft.	Moderately close	Medium
3 ft. – 10 ft.	Wide	Thick
More than 10 ft.	Very wide	Very thick

Rock Quality Designator (RQD) ^b

RQD, as a percentage	Diagnostic description	Openness	Descriptor
Exceeding 90	Excellent	No Visible Separation	Tight
90 – 75	Good	Less than 1/32 in.	Slightly Open
75 – 50	Fair	1/32 to 1/8 in.	Moderately Open
50 – 25	Poor	1/8 to 3/8 in.	Open
Less than 25	Very poor	3/8 in. to 0.1 ft.	Moderately Wide
		Greater than 0.1 ft.	Wide

a. Spacing refers to the distance normal to the planes, of the described feature, which are parallel to each other or nearly so.

b. RQD (given as a percentage) = length of core in pieces 4 in. and longer/length of run.

References: American Society of Civil Engineers. Manuals and Reports on Engineering Practice - No. 56. Subsurface Investigation for Design and Construction of Foundations of Buildings. New York: American Society of Civil Engineers, 1976.
U.S. Department of the Interior, Bureau of Reclamation, Engineering Geology Field Manual.

Appendix B

List of Drawings

The following files will be available to the successful D/B Contractor:

File Name	File Description
SD1.DGN	Survey Drawing

Appendix C
Utility Connections

INDEX

1. Fort Leonard Wood Gas Service Request Form
2. Fort Leonard Wood Electric Service Request Form

FLW Gas Service Request Form

GENERAL INSTRUCTIONS

1. Form Shall be Prepared for each Service Location and type.
2. Please Fill-in Information in the Highlighted Areas.
3. Provide Site Plans with Final Grade Elevations and other services.
4. Provide Site Plans with Proposed service location.
5. Early Coordination is Required to verify Service will be available when needed. Delays due to insufficient time for service availability are not the responsibility of this agency.

Submitted By:		Name:
Company:		
Contract Number with Government:		
Corps of Engineers or DPW Contract:		
Contact Information including e-mail and telephone numbers:		
Reason for Request:		
New Permanent Service:	YES	NO
Upgrade Service:	YES	NO
Temporary Construction Service:	YES	NO
Service Part of Multiple requests for same contract:	YES	NO
(Attach all together when submitting)		of
General Service Information:		
Project Name:		
Project Locations:		
Building Number		
xxx		
Square Footage:		
x		
(Please Check One)		
Others:		
Estimated Demand		

FLW Electric Service Request Form

GENERAL INSTRUCTIONS

1. Form Shall be Prepared for each Service Location and type.
2. Please Fill-in Information in the Highlighted Areas.
3. Provide Site Plans with Final Grade Elevations and other services.
4. Provide Site Plans with Proposed service location.
5. Early Coordination is Required to verify Service will be available when needed. Delays due to insufficient time for service availability is not the responsibility of this agency.

Submitted By:	Name:	
	Company:	
	Contract Number with Government:	
	Corps of Engineers or DPW Contract:	
	Contact Information including e-mail and telephone numbers:	

Reason for Request:		
New Permanent Service:	YES <input type="checkbox"/>	NO <input type="checkbox"/>
Upgrade Service:	YES <input type="checkbox"/>	NO <input type="checkbox"/>
Temporary Construction Service:	YES <input type="checkbox"/>	NO <input type="checkbox"/>
Service Part of Multiple requests for same contract:	YES <input type="checkbox"/>	NO <input type="checkbox"/>
(Attach all together when submitting)		

General Service Information:			
Project Name:			
Project Locations:			
Building Number			
Occupancy Type (NEC 220.12)			
Square Footage:			
Service Voltage (Please Check One)	120 <input type="checkbox"/>	120/240 <input type="checkbox"/>	208Y/120 <input type="checkbox"/>
	480Y/277 <input type="checkbox"/>	480 <input type="checkbox"/>	240 <input type="checkbox"/>
	Others: <input style="width: 100px;" type="text"/>		
Phase	Single <input type="checkbox"/>	Poly <input type="checkbox"/>	
Estimated Demand KVA	<input style="width: 100px;" type="text"/>		

FLW Electric Service Request Form

Connected Load Breakout Information:
Largest Motor:

Horsepower:	<input type="text"/>	LRA:	<input type="text"/>
Voltage:	<input type="text"/>	FLA:	<input type="text"/>
Phase:	<input type="text"/>	Starting PF:	<input type="text"/>
Starting Method:	<input type="text"/>	Running PF:	<input type="text"/>
VFD controlled / Style:	<input type="text"/>	NEMA Code:	<input type="text"/>

Cooling Load:	KVA	<input type="text"/>	Power Factor	<input type="text"/>
---------------	-----	----------------------	--------------	----------------------

Heating Load:	KVA	<input type="text"/>	Type:	<input type="text"/>
---------------	-----	----------------------	-------	----------------------

Interior Lighting:	KVA	<input type="text"/>	Power Factor	<input type="text"/>
--------------------	-----	----------------------	--------------	----------------------

Exterior Lighting	KVA	<input type="text"/>	Type:	<input type="text"/>
-------------------	-----	----------------------	-------	----------------------

Receptacle Load:	KVA	<input type="text"/>
------------------	-----	----------------------

Kitchen Load:	KVA	<input type="text"/>
---------------	-----	----------------------

General Load:	KVA	<input type="text"/>
---------------	-----	----------------------

Total Connected Load:	KVA	<input type="text"/>
-----------------------	-----	----------------------

Below Information is required for Installation Coordination

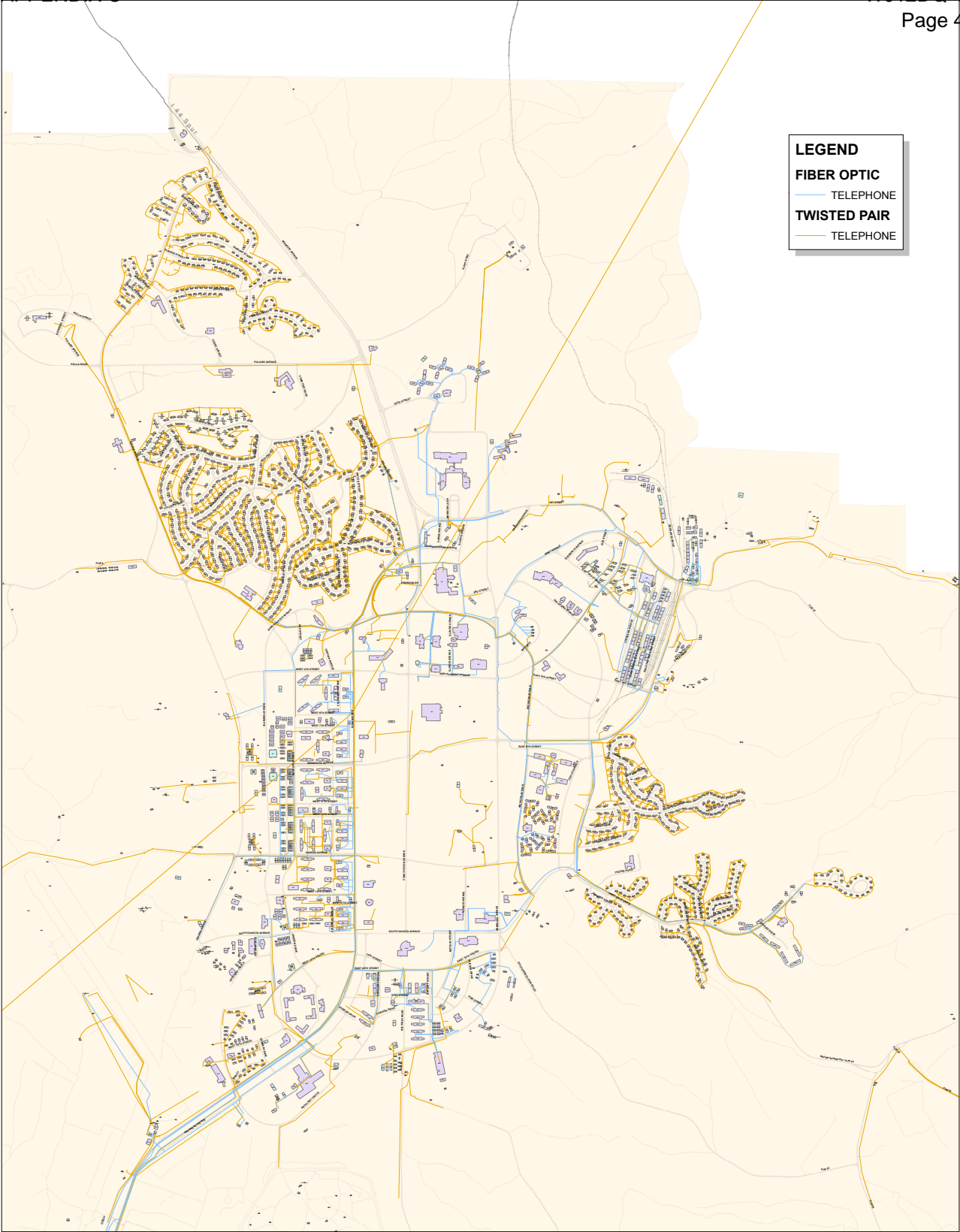
Service Type	Underground <input type="checkbox"/>	
<i>(Please Check One)</i>	Overhead <input type="checkbox"/>	With DPW APPROVAL ONLY

Service

Raceway Size	<input type="text"/>	
Number of Raceway Sets	<input type="text"/>	Spares <input type="text"/>
Conductors Size	<input type="text"/>	Insulation Type <input type="text"/>
Number of Conductors	<input type="text"/>	
Conductor Type	AL <input type="checkbox"/>	CU <input type="checkbox"/>

Service Equipment Type

NEMA TYPE	<input type="text"/>	
Switchboard	CB <input type="checkbox"/>	Fuse <input type="checkbox"/>
Panelboard	CB <input type="checkbox"/>	Fuse <input type="checkbox"/>
Safety Switch (SE Rated)	CB <input type="checkbox"/>	Fuse <input type="checkbox"/>
Over Current Protection Device	<input type="text"/>	
Ampacity	<input type="text"/>	
AVG Motor and other	<input type="text"/>	
Equipment Efficiency	<input type="text"/>	
Ground Fault Protection	Yes <input type="checkbox"/>	No <input type="checkbox"/>



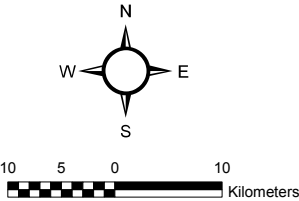
LEGEND

FIBER OPTIC
— TELEPHONE

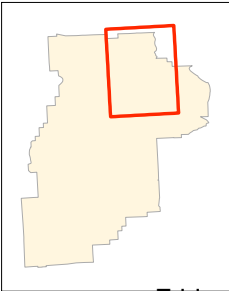
TWISTED PAIR
— TELEPHONE

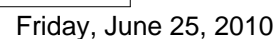
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PUBLIC WORKS.

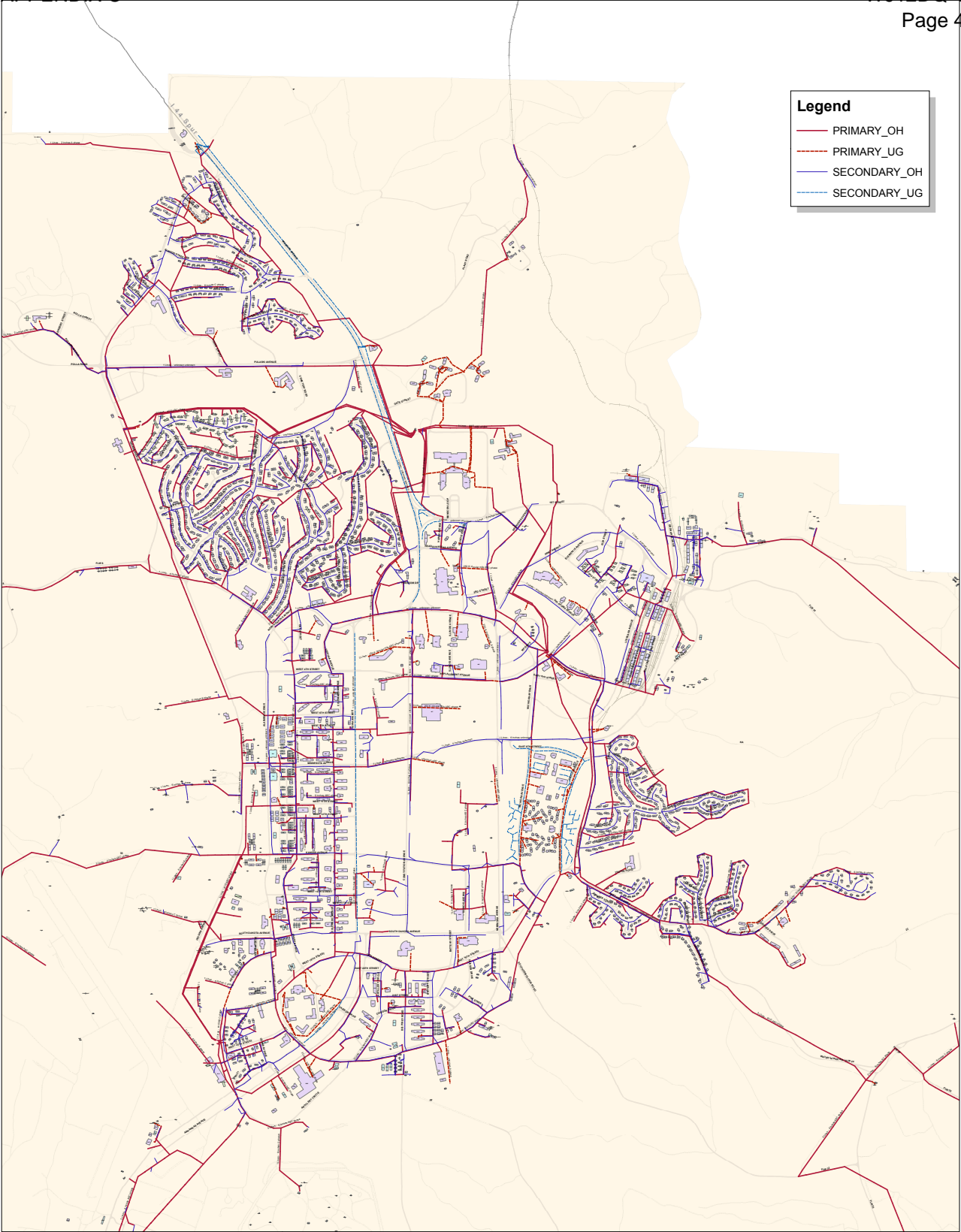
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COMMUNICATION UTILITY PLAN
JULY 2007 SHEET 2 OF 8

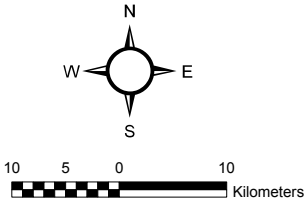






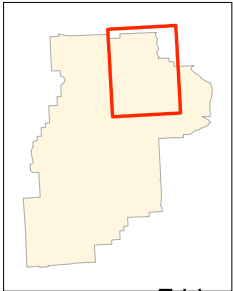
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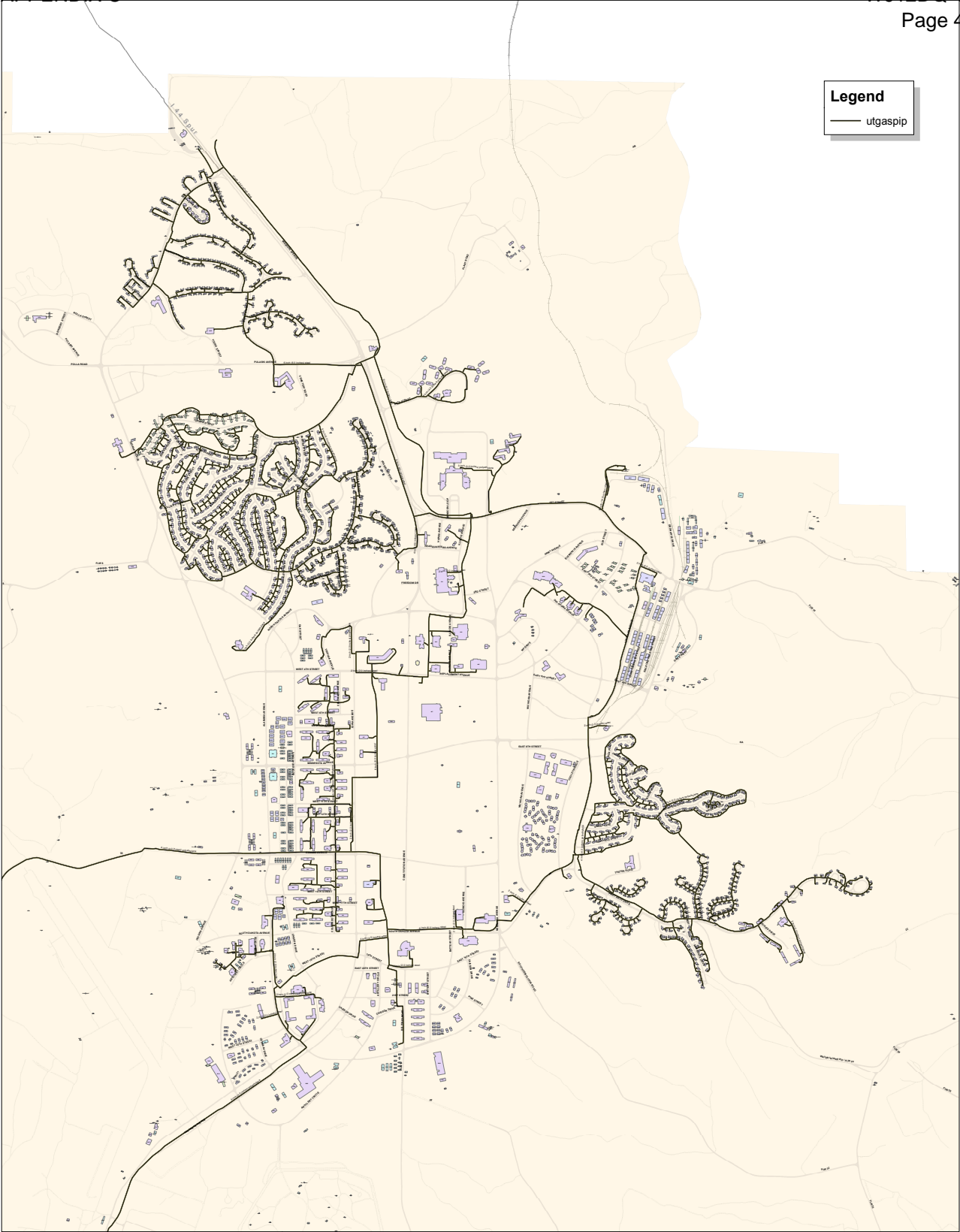


FORT LEONARD WOOD, MISSOURI
BASE INFORMATION MAPPING
ELECTRIC UTILITY PLAN

JULY 2007 SHEET 3 OF 8



Friday, June 25, 2010

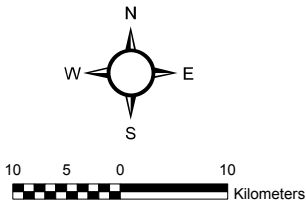


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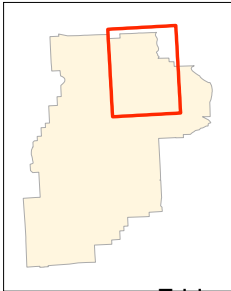
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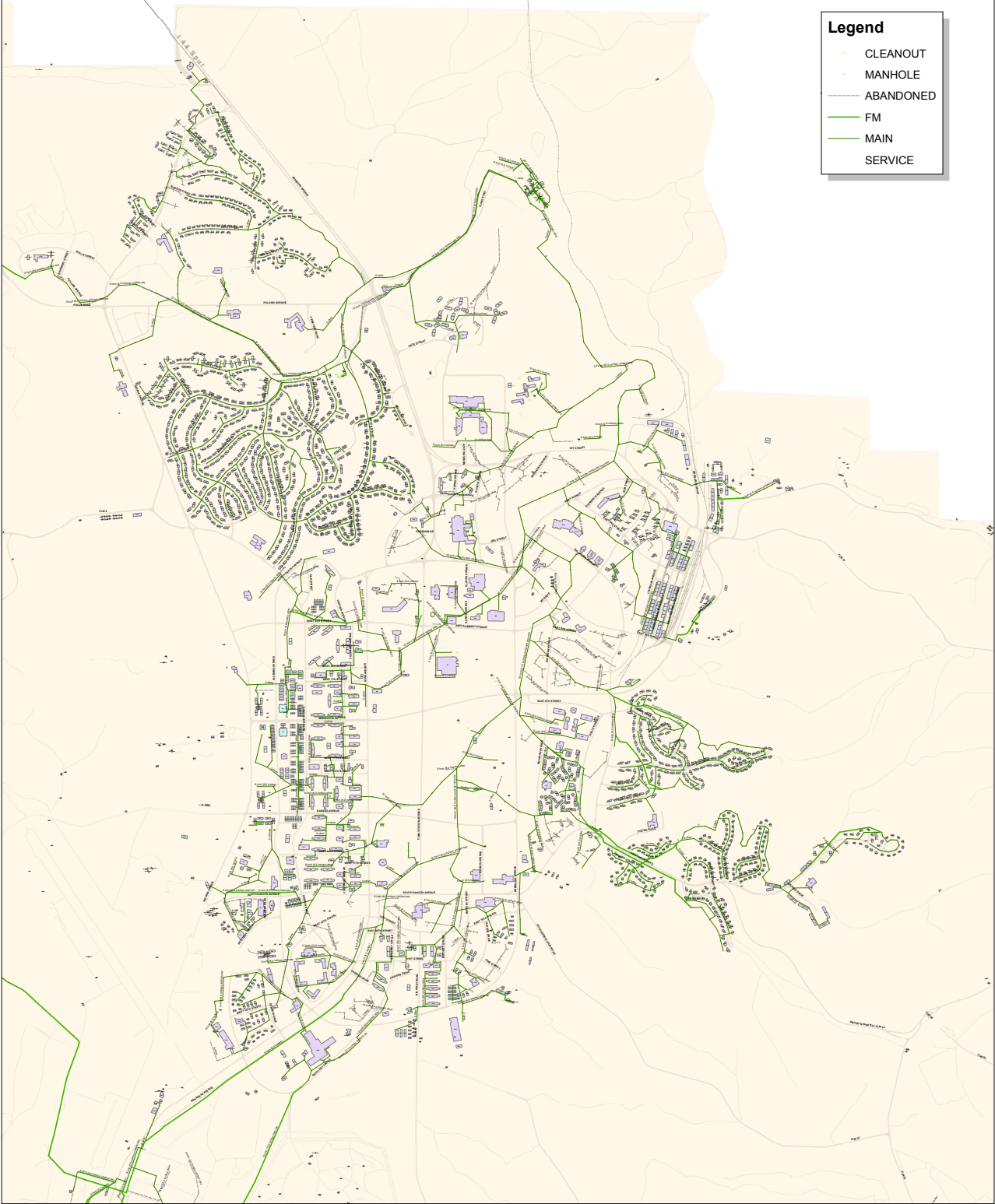


FORT LEONARD WOOD, MISSOURI
BASE INFORMATION MAPPING
NATURAL GAS UTILITY PLAN

JULY 2007 SHEET 4 OF 8



Friday, June 25, 2010



Legend

CLEANOUT

MANHOLE

ABANDONED

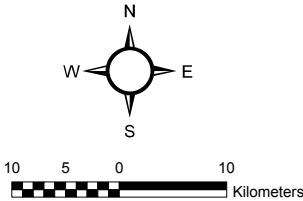
FM

MAIN

SERVICE

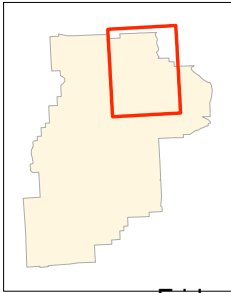
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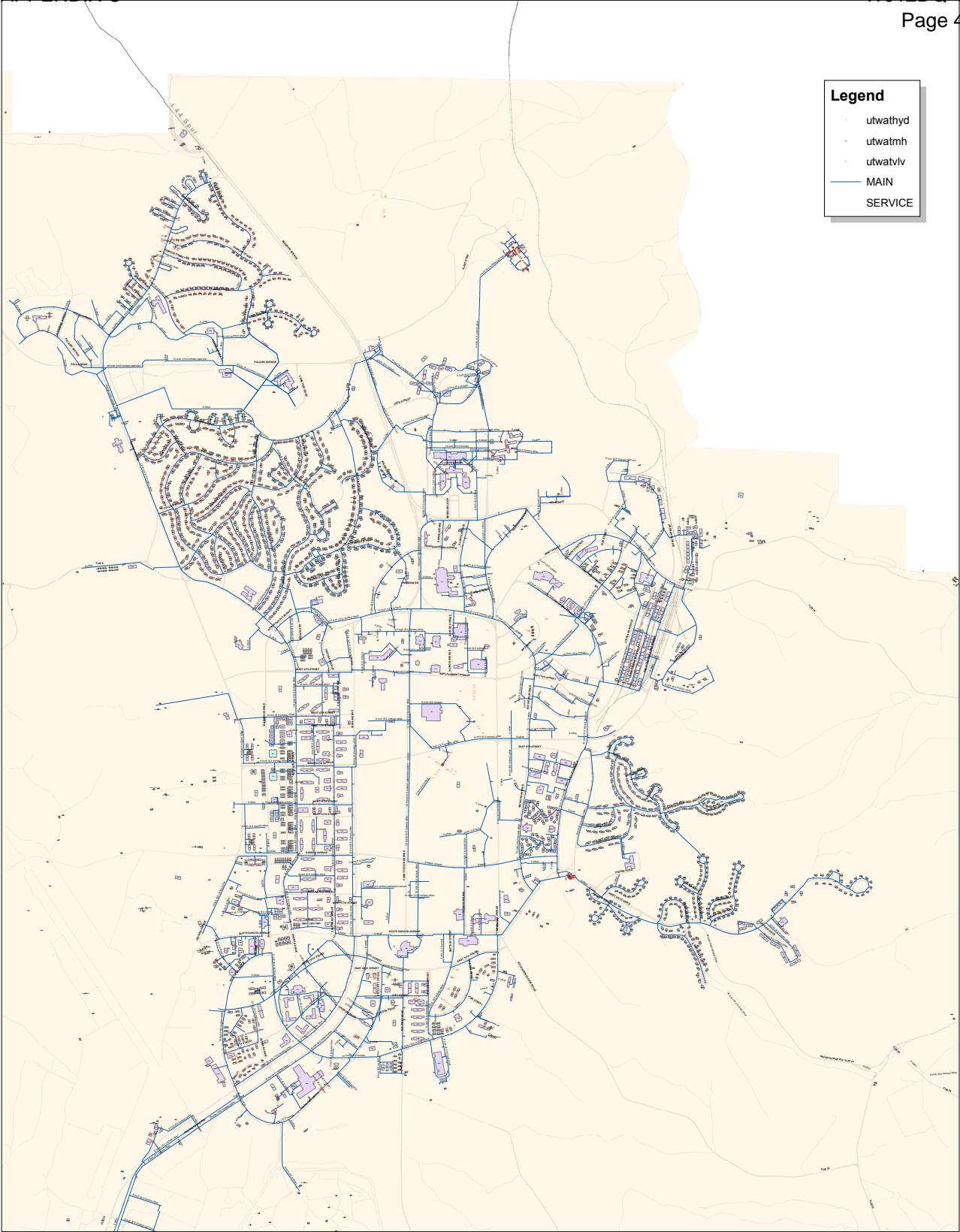


FORT LEONARD WOOD, MISSOURI
BASE INFORMATION MAPPING
WASTEWATER UTILITY PLAN
JULY 2007

SHEET 7 OF 8



Friday, June 25, 2010

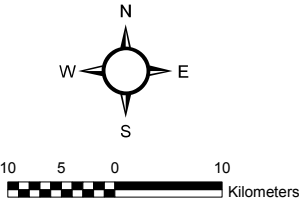


Legend

- utwathyd
- utwatmh
- utwatv
- MAIN
- SERVICE

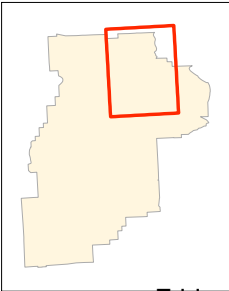
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FORT LEONARD WOOD, MISSOURI
BASE INFORMATION MAPPING
WATER UTILITY PLAN

JULY 2007 SHEET 8 OF 8



Friday, June 25, 2010

APPENDIX D - Fire Flow Test Results

Summary of Water Flow Test Data in the Vicinity of the Site (DPW Provided Data)

Test Number	Test Location	Test Date	Approximate Elevation	Static Pressure (psi)	Residual Pressure (psi)	Available (gpm)
1	Building 310 - GLWACH Hospital	1995	1100	82	72	4016
2	Building 310 - Illinois Ave	1995	1090	70	60	3575
3	Building 490 - Main PX	1995	1070	83	72	3851
4	Building 484 - Ft. Knox Bank	1995	1065	85	75	2746
5	Building 401 - Old Post HQ	1995	1120	69	59	4715
6	Building 2100 - Reception Station	1995	1065	82	67	1075
7	2380 Oklahoma	29-Nov-07	N/A	50	38	1100
8	2380 Oklahoma	11-Apr-08	N/A	55	40	1353

SEE DRAWING FOR TEST LOCATIONS

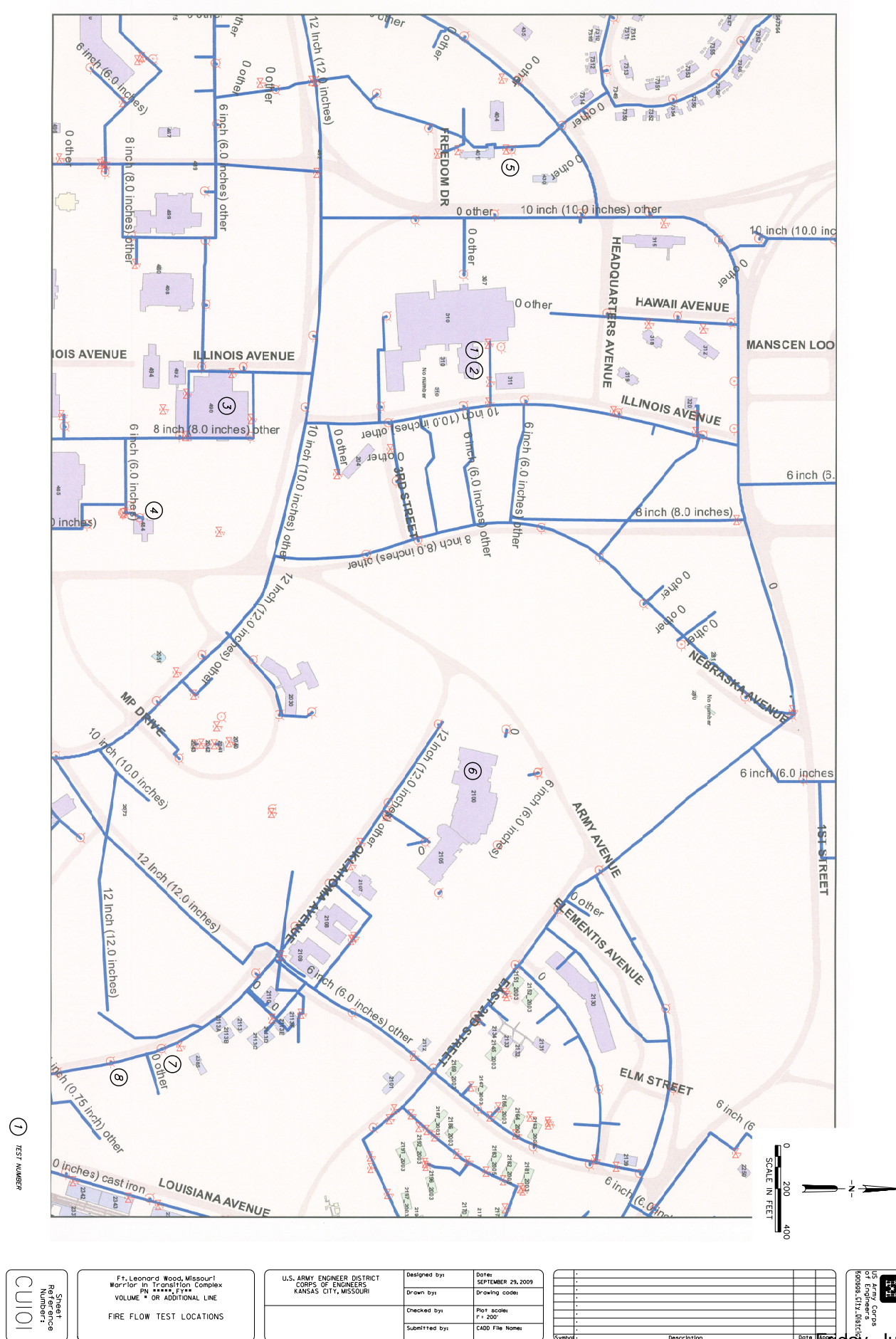


TABLE 2.1 - 1
Water Flow Test Data - DPW Data

Test No.	Aprox. Elev.	Static (psi)	1995		1994		1993		1992		1991		'91-'95		Plug No.	Facility	Location
			TDDT (gpm)	Residual (psi)	Available (gpm)	Available (gpm)	Available (gpm)	Available (gpm)	Available (gpm)	Average (gpm)	Std. Dev. (gpm)						
28	1040	103	500	92	1489	1372	1998	1639	2196	1738.8	348	40 - 101	Kirby St.	4000 Area Housing			
27	1050	100	500	80	1057	1097	795	1181	958	1017.6	148	22 - 15	2500 Area	LP Gas Storage			
32	1060	93	2000	83	5844	3996	5717	9925	2988	5694	2652	70 - 02	Bldg. 8021	Wood Jr. High School			
33	1060	72	500	62	1216	1192	2274	1154	1188	1404.8	486	80 - 23	Bldg. 8041	Williams School			
5	1065	85	1000	75	2746	3420	2628	2780	2062	2727.2	484	4 - 28	Bldg. 484	Ft. Knox Bank			
12	1065	82	500	67	1075	1314	1373	1000	1016	1155.6	175	21 - 18	Bldg. 2100	Reception Station			
6	1070	83	1500	72	3851	3682	3942	3715	nowat	3797.5	121	4 - 17	Bldg. 490	Main PX			
15	1070	80	500	70	1314	noacc	noacc	1916	2266	1832	482	22 - 10	Bldg. 2363	Central Receiving			
1	1075	80	1500	69	3748	3579	2498	2220	2780	2965	670	3 - 14	Bldg. 282	AG HQ			
16	1080	75	1000	65	2510	2510	2432	2312	2381	2429	85	32 - 02	Bldg. 3201	Lincoln Hall Academy			
18	1080	85	1000	70	2206	2746	2150	1853	1904	2171.8	355	40 - 37	Bldg. 4273	Thayer School			
13	1085	65	500	40	903	957	905	969	905	927.8	32	23 - 37	4000 Area	PCL Storage			
29	1090	70	1500	60	3575	4910	3703	3324	3535	3809.4	630	3(00) - 22	Illinois Ave.	East of Bldg. 310			
2	1100	82	1500	72	4016	5146	2628	3715	5256	4152.2	1088	3 - 27	Bldg. 310	GLWACH Hospital			
7	1105	70	1000	60	2383	2250	3324	3438	3238	2926.6	563	4 - 13	Bldg. 499	Truman Ed. Center			
14	1105	53	1000	41	1726	1690	1953	1497	1016	1576.4	353	23 - 14	Bldg. 2352	Laundry			
17	1105	65	1000	52	1952	1192	1945	578	1096	1352.6	592	40 - 92	Bldg. 4102	BOQ			
24	1105	60	500	45	848	1004	1041	1112	1008	1002.6	97	70 - 130	Bldg. 7931	NCO Club			
26	1105	55	1000	40	1579	1997	1782	2054	2241	1930.6	256	23 - 21	Bldg. 2315	Whse adj. RR tracks			
9	1115	68	1000	54	1945	1833	1810	2088	2112	1957.6	140	8 - 08	Bldg. 805	Davis Service Club			
34	1115	61	3000	51	6424	4110	4719	8817	5352	5884.4	1849	70 - 126	Bldg. 8478	Pick School			
35	1115	61	1500	51	3212	3039	3168	3039	3261	3143.8	101	80 - 25	Bldg. 9606	Partridge School			
3	1120	69	2000	59	4715	4392	5020	3294	1770	3838.2	1327	3 - 04	Bldg. 401	Old Post HQ			
8	1120	62	1000	52	1966	1994	2246	1726	2234	2033.2	216	7 - 19	Bldg. 746	3d Bde Gymnasium			
22	1125	64	5500	54	12236	9752	10850	13175	2331	9668.8	4305	70 - 26	Bldg. 6501	Pershing School			
11	1130	52	1500	42	2810	3249	3441	3619	5037	3631.2	842	10 - 02	Bldg. 1607	Walker Rec Center			
21	1135	52	1000	41	1781	2715	nowat	3023	1934	2363.3	601	13 - 05	Bldg. 5400	Brown Hall			
19	1145	52	2000	42	3746	1640	3279	1775	1625	2413	1019	AF - 02	Bldg. 5001	FAAF Fire Station			
4	1150	62	1500	52	3255	3852	4224	6679	7682	5138.4	1929	4 - 08	Bldg. 450	Main Post Chapel			
10	1155	55	2000	45	3931	4186	3619	6456	5895	4817.4	1271	9 - 03	Bldg. 1101	Iowa @ S. Dakota			
20	1155	45	2500	33	3714	3631	3547	3919	4479	3858	374	54 - 18	Bldg. 5265	DOL Maint Complex			
23	1160	40	1500	30	2179	1452	726	2860	1602	1763.8	802	80 - 68	Bldg. 6824	Pence Child Care Cntr			
25	?	72	1000	62	2432	2140	2216	1699	2045	2106.4	269	50 - 07	TA 244	TA 244			
30	?	62	500	46	1039	1034	891	1310	1321	1119	189	23 - 31	2300 Area	Salvage Yard			
31	?	60	1000	42	1916	1966	1696	1941	1000	1703.8	408	22 - 02	2200 Area	DEH Compound			
32	?	50	1000	27	1570	1454	1422	1782	1810	1607.6	181	L - 02	Lake of the Ozarks Rec Area	Lake of the Ozarks Rec Area			
33	7.9	55.5	1333	2859	2757	2822	3155.1	2557.8	2830.2	216							

maximo

Work Order Details Report

WO #: 46025

Job Plan: TE C.5.5.1.3.2.2.1

Safety Plan: N/A

FIRE HYDRANT FLOW TEST

Comments:

Status: SHP

Sched. Start Date: 4/30/2006

Parent:

Report Date: 3/17/2006 5:26:00

Sched. Finish Date: 4/30/2006

Sequence:

IJO/SOO #: DPW020286S

Phase #: 003

Shop Number:

Location: 805

Davis Enlisted Club, Iowa Ave

Equipment: FH00805

FIRE HYDRANT FLOW TEST

PM #: PM5628

PM Frequency: 364

Lead Craft

Work Type

Priority

GL Account

Contract

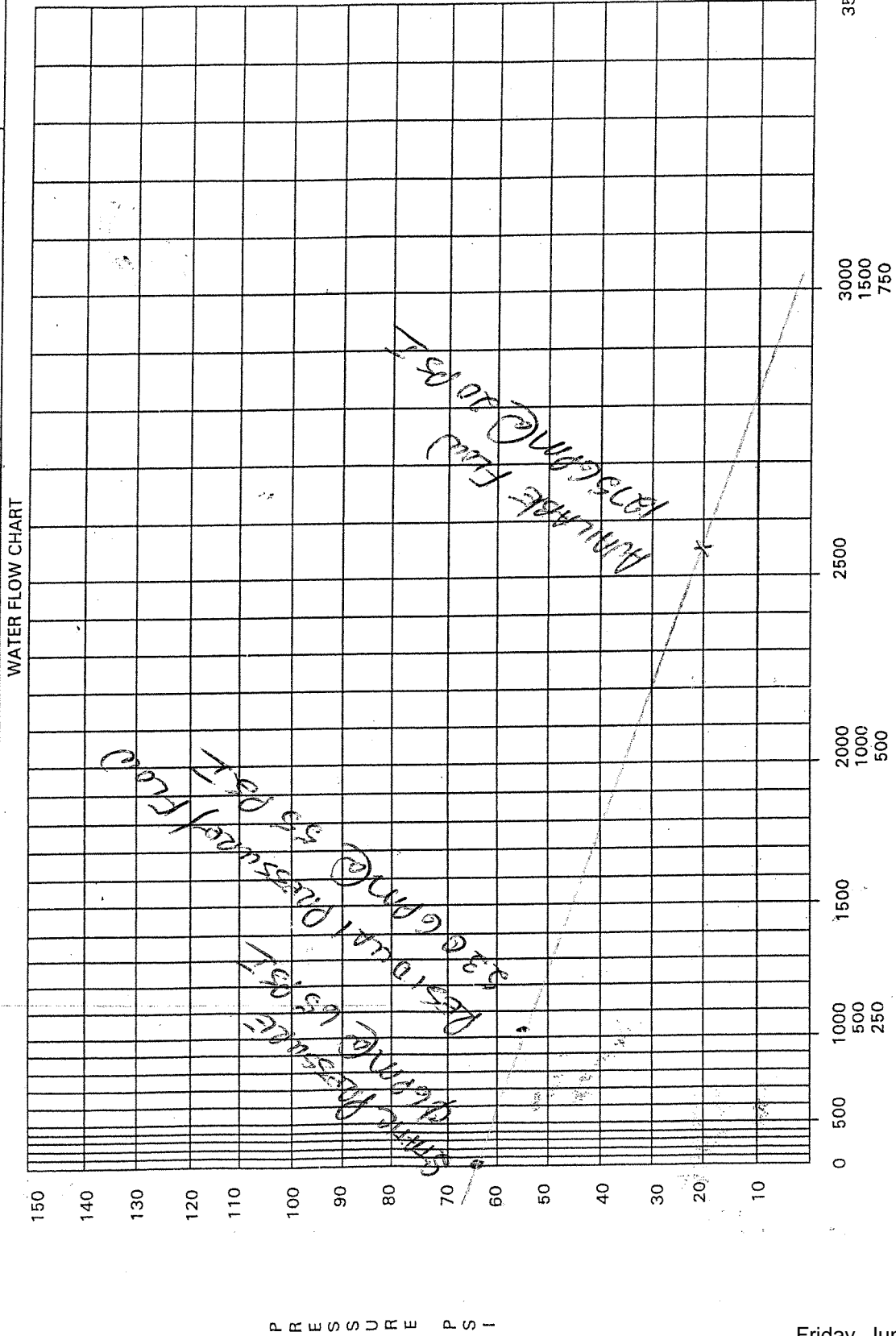
PM

5

[illegible][illegible]

Cost T. 11

WATER FLOW TEST					CATION	DATE
For use of this form, see AR 420-90; the proponent agency is ACSIM						
HYDRANT NUMBER	OUTLET DIAMETER (Inches)	PITOT PRESSURES (PSI)	DISCHARGE (Gallons per Minute)	STATIC PSI	RESIDUAL PSI	
800-002	2 1/2	10	530	65	55	
900-005	2 1/2	10	330			
				TOTAL DISCHARGE DURING TEST (Gallons per Minute)	530	
				AVAILABLE GALLONS PER MINUTE (AT 20 PSI)	1275	



WATER FLOW, GALLONS PER MINUTE

maximo**Work Order Details Report**

WO #: 46024

Job Plan: TE C.5.5.1.3.2.2.1

Safety Plan: N/A

FIRE HYDRANT FLOW TEST**Comments:****Status:** SHP**Sched. Start Date:** 4/30/2006**Parent:****Report Date:** 3/17/2006 5:26:00**Sched. Finish Date:** 4/30/2006**Sequence:****IJO/SOO #:** DPW020286S**Phase #:** 003**Shop Number:****Location:** 746


Cunningham Gymnasium, West 11th St.

Equipment: FH00746

FIRE HYDRANT FLOW TEST

PM #: PM5627**PM Frequency:** 364

Lead Craft	Work Type	Priority	GL Account	Contract
	PM	5		

	HOURS: 1.0	REPAIR DATE: 4-22-06	SIGNATURE: 		
STOCK NUMBER	ITEM DESCRIPTION		QUAN/UNIT	COST CODE	TRUCK STOCK

Quality Assurance**Special Notes:**

Satisfactory

Unsatisfactory

Flow test Results

Starting (PST) 57

Ending (PST) 47

opened two plugs 17, 18

531/1076

WATER FLOW TEST				CATION	DATE
For use of this form, see AR 420-90; the proponent agency is ACSIM					
HYDRANT NUMBER	OUTLET DIAMETER (Inches)	PITOT PRESSURES (PSI)	DISCHARGE (Gallons per Minute)	STATIC PSI	RESIDUAL PSI
700-017	2 1/2	16	530	57	47
700-018	2 1/2	10	530	503	1100
			TOTAL DISCHARGE DURING TEST (Gallons per Minute)		
			503		

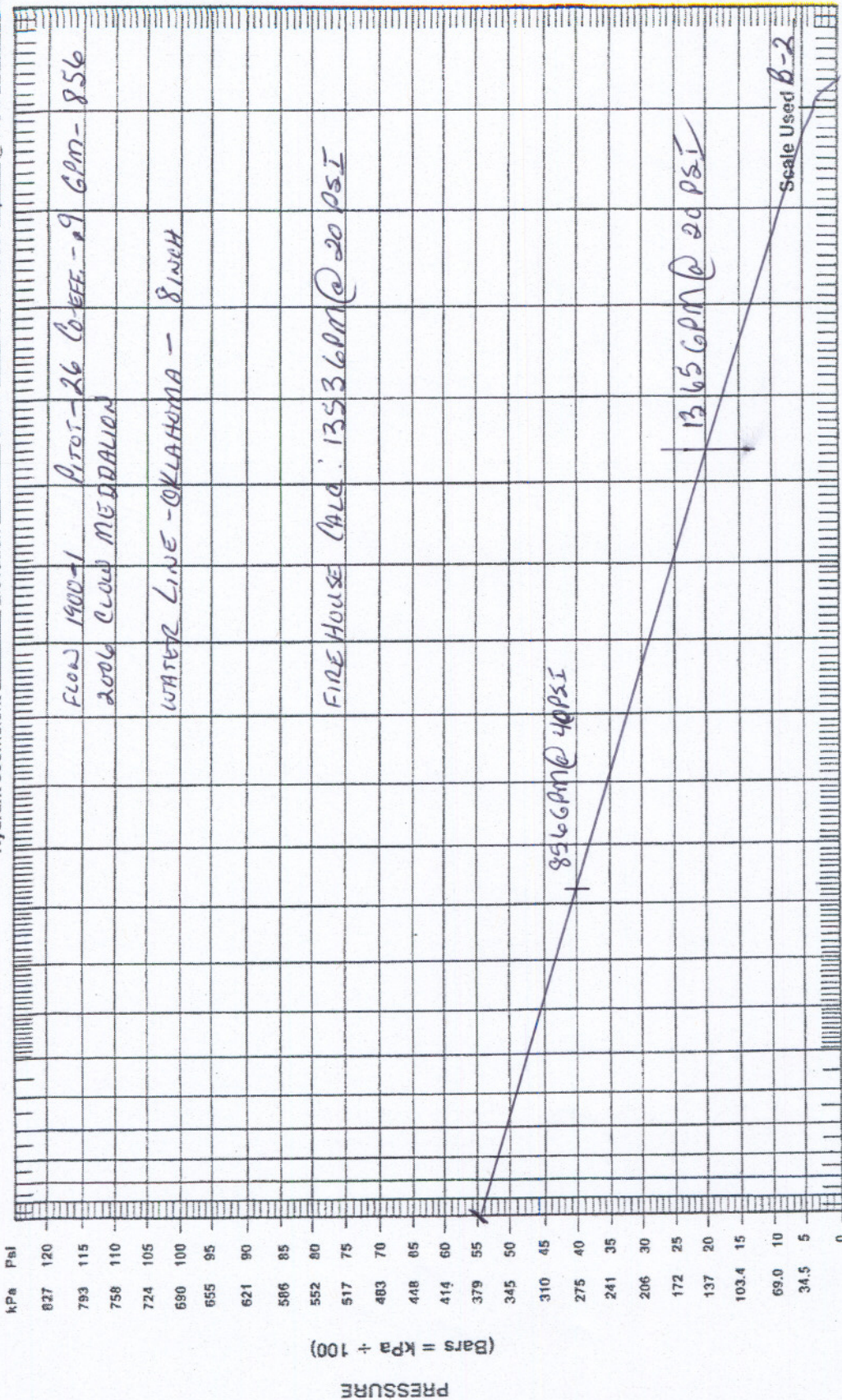
WATER FLOW CHART

P R E S S U R E P S I

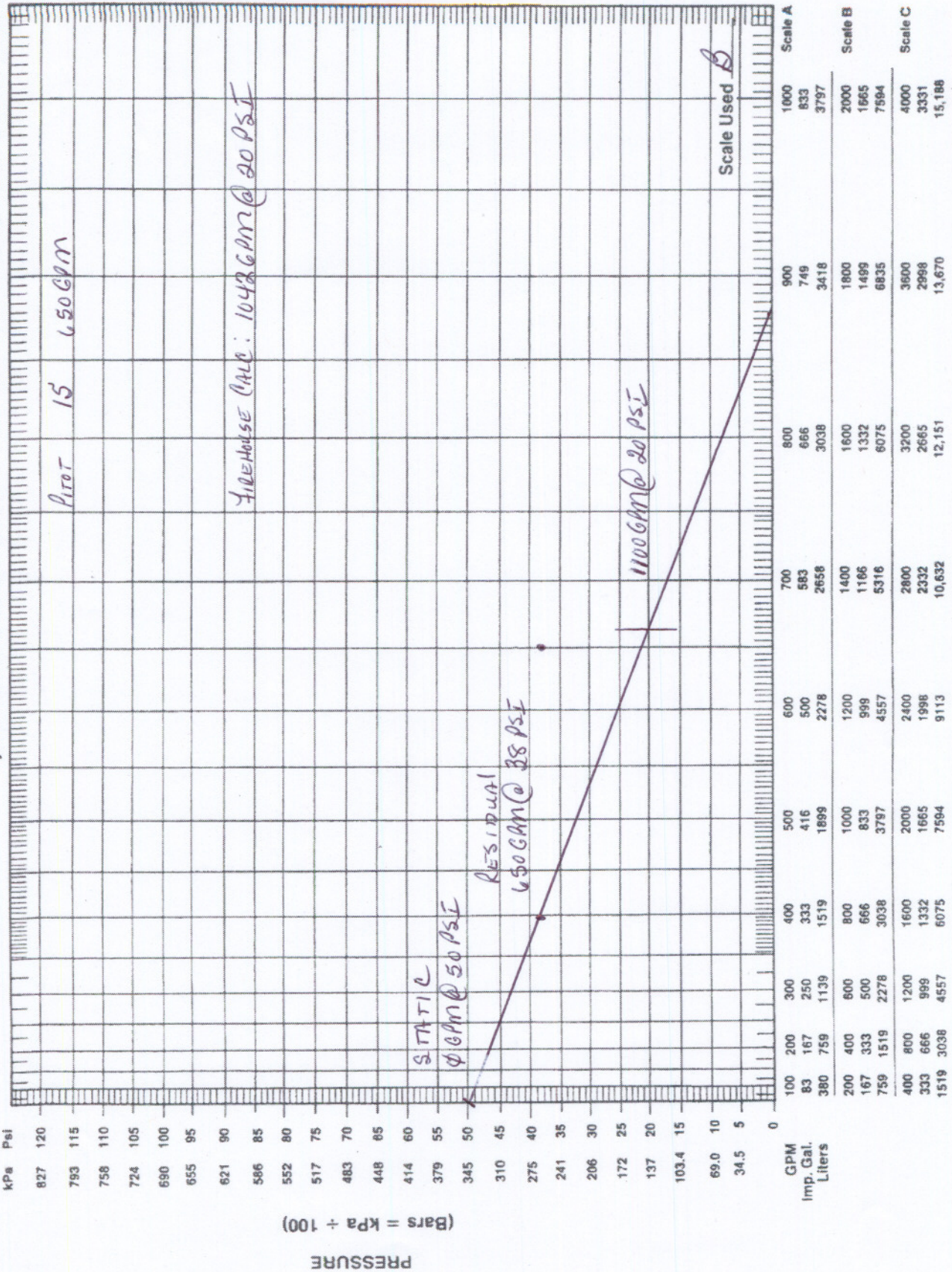
WATER FLOW, GALLONS PER MINUTE

Static Discharge 570 GPM @ 110 PSI
 Discharge 1140 GPM @ 47 PSI
 Available Flow 2085 GPM @ 20 PSI
 Total Discharge 3120 GPM @ 10 PSI

Conducted by M.113 Location 2380 OKLAHOMA Date 4-11-2008
 Hydrant coefficient 1.9 Elevation Static 55 Residual 40 @ Flow GREEN



Conducted by LAB & B Location OKLAHOMA # 2380 Date 11-29-2007
 Hydrant coefficient 188 Elevation Static 50 Residual 38 @ Flow 1100 GPM (GREEN)



FLOW



FORT LEONARD WOOD PERMIT PROCESS AND ENVIRONMENTAL REQUIREMENTS

FLW CONSTRUCTION PERMIT PROCESS

ENVIRONMENTAL REQUIREMENTS

SPILL REPORT FORM

ASBESTOS PROJECT COMPLIANCE AND COMPLETION CERTIFICATION FORM

CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT REPORT

MISSOURI STATE OPERATING PERMIT

LAND DISTURBANCE PERMIT COMPLIANCE SELF CERTIFICATION

**FORT LEONARD WOOD
DIRECTORATE OF PUBLIC WORKS
CONSTRUCTION PERMIT PROCESS**

1. Contractor shall provide the completed application and supporting documentation (including the Professional Engineer stamped drawings for water and waste water main extensions) to the Contracting Officer Representative (COR). Note this is a time consuming effort and the contractor should begin the permit process well in advance of the NTP in order to avoid delaying the start of the project.
2. The COR will submit the above to the Fort Leonard Wood Directorate of Public Works (DPW).
3. Appropriate staff of Fort Leonard Wood DPW (Planning Division, Operations Division, Engineering Division, and Environmental Division) will review.
4. DPW staff comments and/or approves.
5. DPW returns plans/specifications to COR/Contractor with the application transmittal letter signed by the Director of Public Works. This letter serves as the official Permit request. MDNR will not process any application without this DPW transmittal letter.
6. Contractor submits documents, application, and permit fee to the MDNR.
7. MDNR reviews/comments/issues permit.
8. Contractor provides copy of correspondence and Permit to the Fort Leonard Wood DPW Environmental Branch to maintain in the compliance file.
9. Construction begins.
10. All permitted activities will be inspected for compliance by staff from Fort Leonard Wood, the Missouri Department of Natural Resources, the Environmental Protection Agency, Region VII.

ENVIRONMENTAL REQUIREMENTS**ENVIRONMENTAL DIVISION****STANDARD CONTRACT LANGUAGE (revision of 21 December 2009)**

1. **NATIONAL ENVIRONMENTAL POLICY ACT (NEPA):** NEPA requires that all Army facilities complete an environmental impact analysis according to 32 Code of Federal Regulations Part 651 and Army Regulation 200-2, for proposed actions. This analysis considers the anticipated direct, indirect, and cumulative impacts of the specific proposed action on the natural, human, and socioeconomic environment. This project was reviewed by the DPW Environmental Division and a NEPA document prepared which contains a site analysis and site specific requirements. This is a legally binding document and the requirements contained in it must be adhered to in addition to the Standard Environmental Contract Language. The contractor shall reference the NEPA review documents and shall contact the Environmental Division (596-0882) for clarification of any requirement: The documentation will be at the Environmental Division if none is available in the contract, and the contractor shall seek out that information if it has not otherwise been provided prior to the beginning of any contracted activities.
2. **NATURAL RESOURCES:**
 - 2.1. **Forest Products** – If the work area contains trees that must be removed, the area must be surveyed for salvageable forest products, which must be disposed of in accordance with AR 405-90, Disposal of Real Estate, and AR 200-1, Environmental Protection and Enhancement. At such time as the project limits are established, the DPW Natural Resource Branch (NRB) must conduct a survey and provide a map and fair market value of the timber.
 - 2.2. **Threatened & Endangered Species** – If the area contains potential roost trees (dead or dying trees with sloughing bark) for the Indiana bat, a federally endangered species, these trees may only be removed during the period of 01 November through 31 March of the following year.
 - 2.3. **Cultural Resources** – The Contractor shall protect existing historical, archaeological, and cultural resources within the work area and shall be responsible for their preservation during the life of the Contract. Work affecting these resources is not allowed unless prior approval is received by the Fort Leonard Wood DPW Natural Resources Branch. If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this include but are not limited to any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other unexpected constructed feature; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately notify the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made.
3. **WATER QUALITY:**
 - 3.1. **Spill Prevention and Response Plan** – A Spill Prevention and Response Plan is required and shall include the procedures, instructions, and reports to be used in the event of a spill of a substance regulated by 40 CFR 112, 40 CFR 265, and/or regulated under State or Local laws and regulations. This plan shall include the name of the individual who will report any spills or hazardous substance releases, and the individual who will follow up with complete documentation.
 - 3.2. **Spill Response** – Spills of hazardous materials/wastes, and spills of petroleum/oil/lubricants, shall be immediately reported and cleaned up to the satisfaction of the Fort Leonard Wood Environmental Branch at the Contractor's expense. Spills must be reported immediately to the local Fire Department (911), the Fort Leonard Wood Environmental Branch (573/596-0882), and the Contracting Officer (CO/COR). The Contractor shall cease all activity in the area of the spill or in the area of discovered contamination and shall not commence work in that area until so directed by the CO/COR. Contractor shall provide verification, as required, that Contractor employees are properly trained in spill response and cleanup in accordance with all Federal, State, Local, and Fort Leonard Wood laws and regulations and guidance. The

Contractor shall prepare the "Fort Leonard Wood Spill Report" form, **Attachment 1**. The completed form shall be submitted to the Environmental Branch via the CO/COR.

- 3.3. **Secondary Containment** – All petroleum, oil, lubricants, hazardous materials, and hazardous wastes in 55-gallon containers or larger must have secondary containment capable of holding at least 110% of the capacity of the single largest container. This also applies to animal-based and vegetable-based grease commonly associated with dining facilities.
- 3.4. **Rinsate** – Rinsate from cement trucks must be contained on site and not allowed to discharge from the site.
- 3.5. **Backflow Preventers** – All facilities must have backflow preventers on service lines plus potential cross contamination sources.
- 3.6. **Stormwater Runoff and On-site Erosion and Sediment Control** – All sites with land disturbing activities, regardless of size, must install erosion and sediment control measures to prevent erosion and sediment from leaving the land disturbance site. Land disturbing activities 1-acre or greater require a Permit from the Missouri Department of Natural Resources. All sites must be final stabilized through re-vegetation or medium such as gravel or rock.
 - 3.6.1. **Stormwater Runoff** – Section 438 of the Energy Independence and Security Act of 2007 requires "The sponsor of any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow."
 - 3.6.2. **On-site Erosion and Sediment Control** – All sites with land disturbing activities less than 1-acre must install erosion and sediment control measures to prevent erosion and sediment from leaving the land disturbance site and be restored per the approved FLW Excavation Permit, ("Dig Permit") FLW Form 364. Land disturbing activities 1-acre or greater require a Land Disturbance Permit from the Missouri Department of Natural Resources. Refer to Section 6.6 for the Land Disturbance Permit requirements.

4. TOXIC SUBSTANCES:

- 4.1. **Lead-Based Paint** – No lead-based paint (LBP) or materials containing LBP may be used at Fort Leonard Wood. With a demolition or renovation, if the presence of lead-based paint (LBP) is unknown, it should be assumed to be present, especially in structures built prior to 1980. Demolition of structures containing LBP must be done using precautions to prevent the release of the hazardous substance, such as whole component removal. If whole components containing LBP are removed or if a building is demolished, Missouri Department of Natural Resources (MDNR) Solid Waste Regulations require disposal in a State-permitted demolition or sanitary landfill. Or, a structure may be remediated by removing the lead-based paint using lead-safe work practices; however, any lead-based paint removed or recovered from the site must be handled as Hazardous Waste IAW Federal, State, Local, and FLW Regulations. For additional information, contact the DPW Environmental Branch (573/596-0882).
 - 4.1.1. For any lead-based paint remediation performed by a Contractor other than the Base Maintenance Contractor, all lead-based paint and/or other hazardous wastes must be packaged, labeled, marked, and disposed of by the Contractor performing the work according to Federal, State, Local, and FLW Regulations. All hazardous waste manifests must be signed by the FLW Hazardous Waste Program Manager. Manifests shall be provided at least 48 hours prior to the expected shipment date. Under no circumstances will hazardous waste be handled or removed from the site without first consulting with the FLW Hazardous Waste Program Manager. The appropriate test method to make a non-hazardous determination, should the Contractor elect to have the waste tested, is the Toxicity Characteristic Leaching Procedure (TCLP), EPA Method 1311, which is described in Appendix 11, 40 CFR Part 261. All test results shall be provided to the FLW Hazardous Waste Program Manager for review. This includes TCLP testing and any other analytical testing performed that impacts the determination of wastes from this site.
- 4.2. **Non-Liquid Polychlorinated Biphenyls** – PCBs may be present in the caulk used in windows, door frames, masonry columns and other masonry building materials in many buildings, including schools, built

or renovated between 1950 and 1978. The contractor shall coordinate all potential NLPCB related work (i.e., work on such facilities and structures as described above) with the FLW environmental office, who must approve all sampling and work. No PCBs may be used at Fort Leonard Wood. If building materials containing PCBs are to be removed, a PCB Removal Plan shall be submitted to the Fort Leonard Wood Environmental Branch for approval prior to commencement. Contact the Fort Leonard Wood Environmental Branch at 573/596-0882 for further clarification.

- 4.3. **Asbestos Containing Materials** – No Asbestos Containing Materials (ACMs) may be used at Fort Leonard Wood. All 9-square-inch floor tile is assumed to contain asbestos and some 12-square-inch tile contains asbestos, therefore, floor tile that is broken, in poor condition, or is to be disturbed needs to be tested for asbestos content prior to beginning work. Furthermore, if any suspect ACMs are discovered, the project must stop, and the suspect material must be tested for asbestos content. If applicable, the Contractor is responsible for testing and must coordinate the testing with the Fort Leonard Wood DPW Environmental Branch. The testing may be done only by certified individuals. If testing confirms that asbestos is present, then the ACMs may be removed only by individuals certified to remove ACMs, and the ACMs must be disposed of in accordance with all applicable Federal, State, and Local regulations, including Fort Leonard Wood policies. Upon conclusion of the Asbestos removal, the Contractor is required to complete the "Fort Leonard Wood Asbestos Project Compliance and Completion" form, [Attachment 2](#), and submit the completed form to the Environmental Branch via the CO/COR. Contact the Fort Leonard Wood DPW Environmental Branch at 573/596-0882 for more information.

5. WASTE MANAGEMENT:

- 5.1. **Debris Burning** – Fort Leonard Wood restrictions do not allow construction materials, demolition materials, or any debris to be burned.
- 5.2. **Solid Wastes** – Solid wastes (excluding land clearing debris) shall be placed in containers which are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. The Contractor shall transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill shall be the minimum acceptable off-site solid waste disposal. The Contractor shall verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. The Contractor shall comply with Federal, State, local laws and regulations and Fort Leonard Wood guidance pertaining to the use of landfill areas.
- 5.3. **Contractor Generated Hazardous Wastes/Excess Hazardous Materials** – Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 – 178. The Contractor shall, at a minimum, manage and store hazardous waste in compliance with 40 CFR 262. The Contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. The Contractor shall segregate hazardous waste from other materials and wastes, shall protect it from the weather by placing it in a safe covered location, and shall take precautionary measures such as berming or other appropriate measures against accidental spillage. The Contractor shall be responsible for storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 – 178, State, and local laws and regulations. The Contractor shall transport Contractor generated hazardous waste off Government property in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. The Contractor shall dispose of hazardous waste in compliance with Federal, State, and local laws and regulations. Spills of hazardous or toxic materials shall be immediately reported to the local Fire Department (911), the Fort Leonard Wood Environmental Branch (573-596-0882), and the Contracting Officer Representative. Cleanup and cleanup costs due to spills shall be the Contractor's responsibility. The disposition of Contractor generated hazardous waste and excess hazardous materials are the Contractor's responsibility.
- 5.4. **Disposition of Materials** – All materials removed and not reused or designated as salvage material in this project shall become the property of the Contractor. The Contractor shall dispose of such materials at a State and Resource Conservation and Recovery Act approved Treatment, Storage, and Disposal Facility or permitted off-post landfill licensed by the state of Missouri. The Contractor shall lawfully dispose of such materials at the Contractor's sole expense in accordance with the following rules. On a case by case basis, and only with written permission from DPW Environmental Branch and also direction from the

Contracting Officer (CO) or Contracting Officer's Representative (COR), natural land clearing wastes and or clean fill may be allowed to remain on Fort Leonard Wood (FLW) property. Any costs contained in the contract for off site (FLW) disposal shall be reimbursed to the government when disposition of natural land clearing waste and or clean fill is authorized for use on FLW property.

5.5. Recyclable Materials – The Contractor shall recycle products whenever possible and to the fullest extent practicable. Recycling shall be in accordance with all Federal, State, Local, and Fort Leonard Wood laws and regulations and guidance. The Contractor shall deliver all uncontaminated recyclable materials to the Fort Leonard Wood Recycling Center, Building 2549 during normal business hours M-F 0800-1630. Current recyclable materials include clean corrugated and non-corrugated cardboard, plastic and aluminum. Wood pallets in good condition shall be recycled during normal business hours M-F 0800-1630 (see Recycle Center attendant before unloading pallets). Unusable pallets shall be broken up and placed in dumpsters. Materials not currently recyclable by the Fort Leonard Wood Recycling Center shall be disposed of as provided below.

5.6. Disposal of Waste, Natural Materials.

5.6.1. Burning of Woody Natural Materials. Burning of woody natural materials, logs, stumps, limbs etc is allowed only with an Air Curtain Destructor or equivalent high efficiency equipment and only with written approval by the DPW Environmental Branch. The DPW Environmental Branch will review the proposal to determine the potential impact to the Installation's Air Quality Permit and Air Monitors. If authorization is granted, the Contractor will still be subject to shut-down if deemed necessary by the DPW Environmental Branch in order to prevent impacts to training and operations and/or avoid Air Quality Permit compliance impacts. Tonnage of woody natural materials burned will be recorded on the FLW Construction and Demolition waste management report, Attachment #3. All ash generated will be disposed of in accordance with all federal, state, local and FLW guidance and regulations at the contractors expense.

5.6.2. Cantonment – The Contractor shall dispose of leaves and grass clippings (removed from bags) generated by this project at the Fort Leonard Wood Compost Area or off of FLW property and in accordance with all federal, state, local laws and FLW regulations and guidance. The Contractor shall dispose of logs greater than 6 inches in diameter either by disposal at a Fort Leonard Wood Fire Wood Cutting Site (or other designated location on Fort Leonard Wood after written approval is provided by the DPW Environmental Branch and direction is provided by the CO or COR), or by sale or retention for sale, or off of FLW property in accordance with all federal, state, local laws and FLW regulations and guidance. The Contractor shall dispose of wood chips, tree stumps and logs, limbs and brush less than 6 inches in diameter and all other natural waste material off of FLW property, in accordance with all federal state local laws and Fort Leonard Wood regulations and guidance. Or on a case by case basis a site on FLW property may be provided for disposition. Written permission from DPW Environmental must be obtained prior to disposition which will only be done at the direction of the CO or COR. Natural chipped materials may also be beneficially reused on the project site to include permanent on-site erosion control berms only per the NPDES permit not to exceed three (3) feet high by six (6) feet wide, or for disposition or sale as mulch.

5.6.3. Range and Training Areas, potentially containing metal residue from munitions firing - As determined by DPW Environmental Branch and DPTM, all waste natural materials potentially containing metal residue from munitions firing shall remain on site and shall not be mulched, chipped or placed in drainage ways. Any other disposition of materials from these areas shall be in accordance with all federal, state, local laws and FLW regulations and guidance.

5.6.4. Range and Training Areas, without metal residue from munitions firing - Logs greater than 6 inches in diameter *may be* sold or placed at a designated location on Fort Leonard Wood after written approval is provided by the DPW Environmental Branch and direction is provided by the CO or COR). Stumps and Brush less than 6 inches in diameter shall be disposed off of FLW property and in accordance with all federal, state, local laws and FLW regulations and guidance. Wood chips may be used for onsite erosion control berms not to exceed (3) feet high by (6) feet wide, used as mulch or sold. Whole Stumps may be used on site for erosion control in drainage areas or as project design features such as lane markers. No natural Materials listed in 5.6.3 may be brought on to the Training Areas (TAs) or Ranges from other sites for disposition unless they are to be used on site for erosion control or project design features. The Contractor shall remove and dispose of all unused natural waste material from FLW property in accordance with all federal, state, local laws and FLW regulations and guidance before the contract is completed.

- 5.7. Disposal of Waste, Fill Materials** – The Contractor shall dispose of clean waste fill materials (unpainted cinder block, brick and concrete with no exposed steel, rock, asphalt, and clean soil with no organic material) at a landfill off-Post licensed by the State of Missouri to accept such waste, or on a case by case basis and only with written approval by DPW Environmental Branch and also with direction from the CO or COR may use the Fort Leonard Wood Clean Fill site or other sites on FLW approved for use by the DPW and DPW Environmental Branch. Concrete shall have no exposed or protruding steel. The Contractor shall dispose of contaminated waste fill materials at a landfill off-post licensed by the State of Missouri to accept such waste. The Contractor shall provide all necessary information for disposal to the landfill operator, including any required testing of materials and completion of forms required by the Missouri Department of Natural Resources (MDNR).
- 5.8. Disposal of Demolition Waste** – The Contractor shall recycle all construction and demolition waste to the fullest extent possible. The Contractor shall complete the “Fort Leonard Wood Construction and Demolition Waste Management Report”, **Attachment 3**, as specified in the document and comply with all guidance contained in the document. The completed form shall be submitted to the Environmental Branch via the CO/COR. In accordance with Executive Order 13423 “Strengthening Federal Environmental, Energy and Transportation Management” January 24, 2007 a minimum of 50% by weight of the total project solid waste shall be diverted from the landfill. The Contractor shall dispose of demolition waste at a landfill off-post licensed by the State of Missouri to accept such waste. Disposal of demolition waste shall be in accordance with 10 CSR Chapter 80-4. The Contractor shall provide all necessary forms and information for the disposal to the landfill operator and MDNR.
- 5.9. Disposal of Hazardous Waste** – The contractor shall be responsible for the costs of testing and disposal of hazardous waste; all hazardous wastes must be packaged, labeled, marked and disposed of by the contractor performing the work IAW Federal, State, Local, and FLW Regulations. All hazardous waste manifests must be signed by the FLW Hazardous Waste Program Manager. Manifests shall be provided at least 48 hours prior to the expected shipment date. Under no circumstances will hazardous waste be handled or removed from the site without first consulting with the FLW Hazardous Waste Program Manager. The appropriate test method to make a non-hazardous determination, should the contractor elect to have the waste tested, is the Toxicity Characteristic Leaching Procedure (TCLP), EPA Method 1311, which is described in Appendix 11, 40 CFR Part 261. All test results shall be made available to the FLW Hazardous Waste Program Manager for review. This includes TCLP testing and any other analytical testing performed which impacts the determination of wastes from this site. The Contractor shall dispose of any wastes classified as hazardous wastes under the Resource Recovery and Conservation Act (RCRA) in accordance with all Federal, State, local, and Fort Leonard Wood laws and regulations and guidance regarding storage, manifesting, shipment, treatment and disposal of such materials. The storage, containerization, characterization, labeling, placarding, documentation, transportation and final disposition of all hazardous waste will be accomplished in accordance with all Federal, State, local, and Fort Leonard Wood laws and regulations and guidance. The Contractor will procure all necessary licenses, permits and authorizations. All mercury containing thermostats and switches, PCB ballasts and fluorescent lighting will be disposed of through the Fort Leonard Wood base maintenance Contractor according to the Fort Leonard Wood SOP “Lighting and Thermostat Recycle/Disposal Guidance.” The Contractor shall lawfully dispose of materials at the Contractor’s sole expense. Notification and approval by the Contracting Officer and the Fort Leonard Wood Environmental Coordinator is required 10 business days prior to any action related to the disposal of hazardous waste. The Government will have and exercise full and complete control over determining suitability of the Treatment, Storage, and Disposal Facility (TSDF).
- 5.10. Disposal of Other Waste** – The Contractor shall dispose of any wastes not specifically covered here at a landfill off-post licensed by the State of Missouri to accept such waste.
- 5.11. Waste Management Documentation** – The Contractor shall document all wastes disposed of outside of Fort Leonard Wood by delivering to the CO/COR a landfill disposal form signed and dated by the landfill operator which shows the nature, amount and location of materials delivered to the landfill. In case of sale of logs or retention for sale of logs, the Contractor shall provide a signed statement indicating the disposition of the logs. Construction and Demolition debris will be documented on the Fort Leonard Wood Construction and Demolition Waste Management Report form, attached.
- 5.11.1.** When applicable, the Contractor shall provide the generator, at each site, a properly prepared, typed and error-free, hazardous/special waste manifest and the Toxic Characteristic Leaching Procedure (TCLP) EPA method 1311 analysis appropriate to the waste and current waste profile from

the TSDF each time waste is offered for transportation off site. A written Land Disposal Restriction Notice shall accompany each hazardous/special waste manifest, as required. The Contractor shall ensure the completed manifest is returned to the generator within 35 days from the initial transporter's date of signature. The Contractor shall provide the generator at each site a certification of disposal statement for each hazardous/special waste manifest initiated. The Contractor shall also document all waste disposals by delivering to the CO/COR copies of the landfill disposal form signed and dated by the landfill operator which shows the nature, amount, and location of materials delivered to the landfill. In case of sale of logs or retention for sale of logs, the Contractor shall provide a signed statement indicating the disposition of the logs. Copies of this documentation shall be provided to the Contracting Officer prior to requesting final payment on the affected order(s). The work outlined above is a subsidiary portion of the contract work, and is assigned a value of 5% of the value of each affected project. The Contractor shall assign a value of that amount in the breakdown for progress payments. If the Contractor fails to maintain and provide environmental documentation as required herein, the Government will consider that satisfactory progress has not been achieved, thereby requiring the retention of 5% from any request for progress payment, on top of any other retainage applied for cause.

6. **PERMITS:** It shall be the responsibility of the Contractor to obtain *all* permits/licenses required for performance of the contract. The Contractor shall be responsible for determining the fee basis and paying all filing fees and taxes. Payment of fines, penalties, and associated fees for noncompliance or improper performance of applicable work shall be the responsibility of the Contractor. The Contractor shall perform all work in compliance with the Permit. The Contractor shall allow entry to State and Federal regulatory agency inspectors. The Contractor shall be responsible for any fines and penalties associated with non-compliance. The Contractor Copies of the permit applications and associated documentation shall be routed through the Contracting Officer/Contracting Officer Representative to the appropriate DPW Divisions for review and approval prior to submittal. A transmittal letter signed by the current DPW Director will be provided as the Missouri Department of Natural Resources (MDNR) will not accept or process the application for the associated permit without the signed transmittal letter. This is a time consuming effort and the Contractor should begin the permit process well in advance of the Notice to Proceed in order to avoid delaying the start of the project. A copy of all approved permits shall be submitted to the Contracting Officer/Contracting Officer Representative and the Environmental Branch (573/596-0882).

6.1. **Drinking Water Permits** – Should a water main extension or a fire hydrant be installed required as part of this contract, or any modification to the water system that would require a permit as outlined in 10 CSR 60-3, the Contractor is responsible for obtaining that permit from MDNR. Water permits are issued from the Jefferson City Office. In addition to the permit application, eight sets of DRAFT professional engineer stamped plans and specifications must be submitted for the DPW to review prior to final approval from the Director. Government comments must be resolved prior to preparation of final documents. Once approved, two sets of Final Missouri Professional Engineer stamped plans and specifications, along with the completed permit application forms, are submitted to the DPW Operations Division. Once the cover letter has been signed by the DPW Director, the Contractor will then forward plans/specs/permit application/fees to MDNR. Should MDNR require additional information, the same procedures will be followed prior to forwarding to the State. A copy of the permit must be provided to the DPW Environmental Branch for official records within five (5) business days of receipt. Any permit application fees are to be paid by the Contractor. The Contractor is responsible for full compliance with all terms and conditions of the permit. This work may not proceed until the State issued permit is provided and posted at the job site as required by the permit. Once the project is complete, the Contractor's Professional Engineer will complete the "Statement of Work Completed" form, furnished with the permit and provide the signed form to the DPW Environmental Branch for forwarding to MDNR.

6.2. **Waste Water Permits** – Should a waste water main extension or a Lift Station be installed as part of this contract, or any modification to the wastewater system that would require a permit as outlined in 10 CSR 20-6.010, the Contractor is responsible for obtaining that permit from MDNR. Waste water permits are issued from the Rolla Satellite Office. In addition to the permit application, eight sets of DRAFT professional engineer stamped plans and specifications must be submitted for the DPW to review prior to final approval from the Director. Government comments must be resolved prior to preparation of final documents. Once approved, two sets of Final Missouri Professional Engineer stamped plans and specifications, along with the completed permit application forms, are submitted to the DPW Operations

Division. Once the cover letter has been signed by the DPW Director, the Contractor will then forward plans/specs/permit application/fees to MDNR. Should MDNR require additional information, the same procedures will be followed prior to forwarding to the State. A copy of the permit must be provided to the DPW Environmental Branch for official records within five (5) business days of receipt. Any permit application fees are to be paid by the Contractor. The Contractor is responsible for full compliance with all terms and conditions of the permit. This work may not proceed until the State issued permit is provided and posted at the job site as required by the permit. Once the project is complete, the Contractor's Professional Engineer will complete the "Application for Letter of Authorization" form, furnished with the permit, and provide the form to the DPW Environmental Branch to be submitted to MDNR. If a waste water Lift Station is required as part of this contract, a backup generator is required for support in the event electrical power becomes unavailable.

6.3. Air Permits – Air emissions sources require construction permits in Missouri. Air permits are issued for the specific design and equipment (stacks, vents, exhaust systems, open vats, storage tanks (sources of evaporation), incinerators, boilers, generators (i.e., any combustion equipment), etc.). It is the Contractor's responsibility to obtain permits before construction starts and ensure compliance with the permit. Route all air permit requests through the CO/COR.

6.4. Land Disturbance Permits (National Pollutant Discharge Elimination System Permits) – Land disturbance is defined as any activity that disturbs the root zone of vegetation or disturbs compacted soil to an erodible state such as clearing, grubbing and grading. Should the project entail land disturbance of 1-acre or greater, but less than 5-acres, State Form O must be completed (in accordance with 10 CSR 20-6.200) and provided to the Contracting Officer/Contracting Officer Representative. For projects that cause land disturbance of 5 acres or more, State Forms E and G must be completed (in accordance with 10 CSR 20-6.200) and provided to the Contracting Officer/Contracting Officer Representative (CO/COR). In addition, a Storm Water Pollution Prevention Plan (SWPPP) must be provided (in accordance with 10 CSR 20-6.200) that includes a site specific sketch/drawing showing all planned erosion control devices. In addition to the appropriate State forms, a USGS 1" = 2,000' scale map showing the exact location of the project is required. Once approved, a signed cover letter from the Director of Public Works will be provided to the Contractor to include with the application. The Contractor will forward the permit application/drawings/fees to the MDNR. Any permit application fees are to be paid by the Contractor.

6.4.1. The Contractor is responsible for compliance with all terms and conditions contained in the permit until the Permit is formally terminated by the Missouri Department of Natural Resources. Earth disturbing activities may not proceed until the State issued permit is obtained and posted at the job site as required by the permit. **Attachment 4** provides a sample copy of a Permit.

6.4.2. Each site with a Land Disturbance Permit must provide copies of the completed weekly inspection reports and completed inspection reports no more than 48-hours after a rain event. The Contractor must also complete and submit monthly the "Fort Leonard Wood Land Disturbance Permit Compliance Self Certification" form, **Attachment 5**. All inspection reports and monthly Compliance Certification submittals are required until the Permit is terminated by the Missouri Department of Natural Resources. All submittals are to be provided within 5-days of completion to the DPW Environmental Branch via the CO/COR.

6.4.3. Interim soil stabilization is required until final stabilization is met. All sites must be final stabilized as per the Missouri Permit: "The project is considered to be stabilized when perennial vegetation, pavement, buildings, or structures using permanent materials cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetative cover shall be at least 70% of fully established plant density over 100% of the disturbed site." Use of Missouri native perennial vegetation is highly encouraged.

6.5. Missouri Separate Storm Sewer (MS4) Permit – Construction activities occurring on Department of Army Fort Leonard Wood property are regulated by a Municipal Separate Storm Sewer System (MS4) Permit. This is a permit, regulated by the Environmental Protection Agency under the Clean Water Act and administered by the Missouri Department of Natural Resources, legally mandates that Fort Leonard Wood decrease the quantity and increase the quality of stormwater runoff through improved site design, and

selection and maintenance of Best Management Practices that minimize point and non-point pollution sources. This permit requires that Fort Leonard Wood maintain a rigorous land disturbance oversight program that proactively enforces adherence to land disturbance permit requirements regulating pre- and post-construction runoff from permitted activity, and report the status of compliance annually.

7. **ENERGY AND SUSTAINABILITY:** The Federal government is committed to designing, locating and constructing, maintaining, and operating its facilities in an energy efficient and sustainable manner. It shall be the responsibility of the Contractor to comply with all of the following federal energy and sustainability executive orders and policies. The Contractor shall be responsible for determining the applicability of each of these for their project. Copies of each of these requirements can be obtained from the Contracting Officer/Contracting Officer Representative or the Environmental Branch (573/596-0882).
 - 7.1. **Heating, Ventilation, Air Conditioning (HVAC)** – The Army standard is that no Class I or Class II ozone-depleting substances (ODSs) may be used and that any alternative refrigerants must have a Toxicity Clearance through the Center for Health Promotion and Preventive Medicine (CHPPM). Contractors may access the list of CHPPM Toxicity Clearances at the following website: <http://chppm-www.apgea.army.mil/tox/product.aspx>
 - 7.2. **DoD Green Procurement Program (GPP)** – The DoD GPP requires green products and services to be purchased to the maximum extent practicable. The Contractor shall comply with applicable Federal Acquisition Regulations (FARs). The Contractor shall consult with the contracting official to determine the applicability of the GPP to their project.
 - 7.3. **Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management, 26 Jan 07** – The Federal Government is required to adhere to the environmental, energy and transportation requirements outlined in the state executive order. Therefore, Contractors must be able to work with the federal government to comply with these requirements. Examples of required goals include improved energy efficiency and reduced green house gas emissions, reduced water consumption, green procurement, and high performance building requirements.
 - 7.4. **Energy Policy Act of 2005** – The Contractor shall support the Federal Energy Reduction Goals as required by the Energy Policy Act of 2005. Contractor must adhere to the regulations and specifications contained within this Act. Contractor must consider the cost of required energy reductions when preparing Request for Proposal.
 - 7.5. **Energy Independence and Security Act of 2007** – The Contractor shall support the Federal requirement that all lighting in Federal Buildings use Energy Star products. The Contractor shall ensure compliance with Subtitle C – High-Performance Federal Buildings. This requirement has applications to building energy use and HVAC systems as well as the following stormwater requirements. Refer to Section 3.6.1 for the stormwater requirements.
 - 7.6. **Army's Sustainable Design and Development (SDD) Policy**
 - 7.6.1. **Military Construction Program** – All vertical construction projects with climate-controlled facilities (mechanically heated or cooled for human comfort) must achieve the SILVER level of Leadership in Energy and Environmental Design – New Construction (LEED-NC). This requirement applies to all construction on Ft. Leonard Wood, including Army Reserve, Army Readiness Centers and Armed Forces Reserve Centers, regardless of funding source and including BRAC. All LEED projects must be registered with the US Green Building Council and must be certifiable by the USGBC. Five percent of Army building projects are chosen for validation, in which case, certification is required. Associated costs shall be captured in the DD Form 1391.
 - 7.6.2. **Garrison-level Approved Projects** – Projects authorized to be approved by the Garrison Commander - shall incorporate SDD features to the maximum extent possible but are exempt from meeting the minimum score requirement for the SILVER level of LEED. Incorporating SDD can increase energy efficiency and reduce energy costs, increase the tonnage recycled minimize pollution
 - 7.6.3. **Exemptions**

- 7.6.3.1. Horizontal construction projects (ranges, roads, airfields, etc.) shall incorporate SDD features to the maximum extent possible, but are exempt from meeting the minimum score requirement for the SILVER level of LEED.
- 7.6.3.2. The requirement to achieve the SILVER level of LEED applies to permanent facility construction only; required interim facilities are exempt. An interim facility requirement is a short-term urgent requirement for facilities lasting three years or less, normally.
- 7.6.3.3. Renovation and Repair projects are required to incorporate SDD features and be scored using LEED-NC, but are exempt when they do not exceed the garrison commander authority or they have a repair to replacement ratio less than or equal to 25%.

7.7. Conformance with the Fort Leonard Wood ISO 14001 Environmental Management System - The

Contractor shall perform work under this contract consistent with the policy and objectives identified in the Fort Leonard Wood ISO 14001 Environmental Management System (EMS). The Contractor shall perform work in a manner that conforms to all appropriate Environmental Management Programs and Operational Controls identified by the Fort Leonard Wood EMS. In the event of an environmental nonconformance or noncompliance associated with the contracted services, the Contractor shall take corrective and/or preventative actions. In the case of a noncompliance, the Contractor shall respond and take corrective action immediately. In the case of a nonconformance, the Contractor shall respond and take corrective action based on the time schedule established by the EMS Coordinator. In addition, the Contractor shall ensure that their employees are aware of the roles and responsibilities identified by the SMS and how these requirements affect their work performed under this contract. Information can be found in the Contractor Section of the DPW Environmental Division Website.

- 7.7.1. All on-site Contractor personnel shall complete FLW EMS awareness training, and as is identified in the Training Requirements of the Contractor Section of the DPW Environmental Division Website (www.wood.army.mil/dpwenv).

State Permits, Notifications, and Fees Environmental Branch Points of Contact

The following table provides a short checklist of actions that generally require an environmental compliance review or require a permit or other document. This is not an all-inclusive list. If in doubt, please contact the Environmental Division for assistance at 573/596-0882.

REGULATORY AREA	DOCUMENT, PERMIT or NOTIFICATION	COST (estimated)	PROCESSING TIME (estimated)	FLW CONTACT
Asbestos Work: Required for all Friable Asbestos projects	Notification 10-days prior to work start	\$0	none	Keith Duncan
Land Disturbance- Erosion Control: Any earth disturbance 1-acre or greater	Erosion Control Permit	\$300	Up to 6-months from date State receives application and fee payment	Emily Borwn
Drinking Water: New/changes to the systems to include distribution system	Water Permit to "Construct"	\$50-\$3K	Up to 6 months from date State receives application, with plans/specs, and fee payment. PE stamp required	Carl Stenger
Waste Water: New/changes to: systems to include collection system	Water Permit to "Construct"	\$50-\$3K	Up to 6 months from date State receives application, with plans/specs, and fee payment. PE stamp required	Carl Stenger
Tanks- Underground: New/changes to: Underground Storage Tanks	Notification required	\$100	Minimum 30-days upon receipt of notice and fee payment, prior to work start	Carl Stenger
Tanks-Aboveground: New/changes to Aboveground Storage Tanks	Permit to "Construct"	\$150	Approx 60-days from date State receives request for permit determination and receives fee payment	Carl Stenger
Tanks: Install new fuel storage tanks	Permit to "Construct"	\$150-\$10K	Up to 9-months from date State receives application with plans/specs and fee payment	Carl Stenger
Utilities: Install new/replace emergency generators	Air Permit to "Construct"	\$150-\$10K	Up to 9-months from date State receives application with plans/specs and fee payment	Steve Flier
Utilities: New/changes to: large facility HVAC systems	Air Permit to "Construct"	\$150-\$10K	Up to 9-months from date State receives application with plans/specs	Steve Flier
Utilities: Replace Boiler or install new boiler(s)	Air Permit to "Construct"	\$150-\$10K	Up to 9-months from date State receives application with plans/specs	Steve Flier



Fort Leonard Wood Directorate of Public Works Environmental Division



Spill Report

All spills, regardless of volume, must be reported immediately by dialing 911. Within 3 days of the incident, this form must be completed and submitted to DPW Environmental Office (Bldg 2101). Telephone Environmental at (573) 596-0882 during duty hours for more information.

1. Telephone report to DPW made by:	
Name:	Signature:
Title:	Location:
Date:	Time:
2. Material Spilled:	
3. Volume Spilled:	
4. Location of Spill:	
5. Date, Time, and Duration of Spill:	
6. Cause of Spill:	
7. Spill:	Corrective Actions Taken to Control and/or Mitigate the Effects of the
8. Plan for Preventing Recurrence:	
9. Other Contacted, i.e., Fire Department	
Name:	Date/Time:
Name:	Date/Time:
Name:	Date/Time:



**Fort Leonard Wood
Directorate of Public Works
Environmental Division**



Asbestos Project Compliance and Completion Certification

The below project removed Asbestos Containing Material (ACM).

Work Order or Project Number: _____

Contract Number: _____

Project Name or Description: _____

Project Bldg Number or Location: _____

ACM Removal Date: _____

I certify that all ACM specified for removal in this project was properly removed and disposed in accordance with applicable federal law (40 CFR Part 61, Subpart M, National Emission Standard for Hazardous Air Pollutants (NESHAP)) and industry best practices. There is no ACM debris resulting from this project remaining on site.

Signature of ACM Removal Representative: _____ Date: _____

Name of Asbestos Abatement Company: _____

I inspected the completed asbestos removal project and certify that the asbestos abatement is complete and meets the terms of the government contract:

Signature of Government Contract Inspector:

_____ Date: _____

I accompanied the government contract inspector on this ACM removal project and certify that I witnessed no ACM remaining and that it appears to be a complete removal project.

Signature of DPW Asbestos Inspector:

_____ Date: _____



Fort Leonard Wood Directorate of Public Works Environmental Division



Construction and Demolition (C&D) Waste Management Report

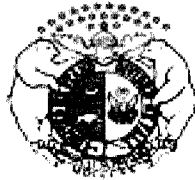
The contractor shall make all reasonable efforts to recycle and recover C&D from this project. A minimum of 50% by weight of total project solid waste shall be diverted from the landfill in accordance with Executive Order 13423 "Strengthening Federal Environmental, Energy, and Transportation Management" January 24, 2007. Waste management consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project mandates. Companies and facilities used for recycling, reuse, and disposal shall be appropriately permitted for the intended use to the extent required by federal, state, and local regulations.

The contractor shall provide on-site instructions for separating, handling, recycling, salvage, reuse and return methods to be used by all parties at the appropriate stages of the project. Records shall be maintained to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed of by the landfill or incineration. This form shall be used to record the information. The contractor shall submit this report of all non-hazardous (C&D) waste generation no later than 10 days after each fiscal year quarter ends, starting the first quarter that C&D waste is generated. This report shall be submitted through the contracting officer or representative to the Directorate of Public Works Solid Waste Program Manager (573 596 0882), Bldg 2101. Contractor shall provide an electronic or paper copy.

Project Name:	Location:
Contract Number:	Report Period Covered: _____ to _____
Contractor:	Prepared By:
	Date: ____/____/____
Gov't Contract Inspector:	Phone:
Email:	

Waste Type	Total Generated (by weight in tons)	Management Method (by weight in tons)	
		Recycled or Salvaged	Disposed
Examples: Concrete	505, 000 tons	500,000 tons crushed for reuse at _____	5000 tons to landfill
Mixed Debris	1000 tons	0	1000 tons to landfill
Scrap Metal	10 tons	10 tons Recycled to A1 Metals	0
Wall Board/Sheet Rock			

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



MISSOURI STATE OPERATING PERMIT

GENERAL PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended.

Permit No. < MO-R101000 for existing sites or MO-R10A000 for new sites >

Owner: < name >

Address: < address >

Continuing Authority: < name, or Same as above >

Address: < address, or Same as above >

Facility Name: < name >

Facility Address: < physical address >

Legal Description: ¼, ¼, ¼, Sec. xx, TxxN, RxxW, < county > County

Receiving Stream: < receiving stream > < (U, C, P, L1, L2, L3) >

First Classified Stream and ID: < 1st classified stream > < (U, C, P, L1, L2, L3) > < (ID number) >

USGS Basin & Sub-watershed No.: < (USGS HUC14 #) >

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

All Outfalls

Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, and other activity that results in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state).

This permit authorizes only wastewater, including storm waters, discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 644.051.6. RSMO.

February 8, 2007

Issue Date

Effective Date

Doyle Childers, Director, Department of Natural Resources
Executive Secretary, Clean Water Commission

February 7, 2012

Expiration Date

Director of Staff, Clean Water Commission

APPLICABILITY

1. This general permit authorizes the discharge of storm water and certain non-storm water discharges from land disturbance sites that disturb one (1) or more acres over the life of the project or are part of a larger common plan of development or sale that will disturb one (1) or more acres over the life of the project. This general permit also authorizes the discharge of storm water and certain non-storm water discharges from smaller projects where the Department has exercised its discretion to require a permit [10 CSR 20-6.200 (1)(B)].

A Missouri State Operating Permit that specifically identifies the project must be issued before any site vegetation is removed or the site disturbed.

Any site owner/operator subject to these requirements for storm water discharges and who disturbs land prior to permit issuance from the MDNR is in violation of both State and Federal laws.

2. This permit authorizes non-storm water discharges from the following activities provided that these discharges are addressed in the permittee's specific Storm Water Pollution Prevention Plan (SWPPP) required by this general permit:
 - a. Dewatering activities if there are no contaminants other than sediment present in the discharge, and the discharge is treated as specified in Requirements, Section 8.j. of this permit.
 - b. Flushing water hydrants and potable water lines;
 - c. Water only (i.e., without detergents or additives) rinsing of streets and buildings, or
 - d. Site watering to establish vegetation.
3. This permit does not apply to storm water discharges within 1000 stream feet of:
 - a. Streams identified as a losing stream*;
 - b. Streams or lakes listed as an outstanding national or state resource water*;
 - c. Reservoirs or lakes used for public drinking water supplies*;
 - d. Streams, lakes, or reservoirs identified as critical habitat for endangered species*;
 - e. Streams, lakes, or reservoirs listed as impaired for sediment and/or an unknown pollutant by standard MDNR methodology*.
4. This permit does not apply to storm water discharges:
 - a. Within 100 stream feet of a permanent stream (class P) or major reservoir (class L2)*; or
 - b. Within two stream miles upstream of biocriteria reference locations*.

(For the purpose of this permit, "stream feet" shall be defined as: The measurement of the distance between the land disturbance site and the valuable resource water by means of the nearest drainage course.)

5. This permit does not apply to storm water discharges where:
 - a. Any of the disturbed area is defined as a wetland (Class W) by 10 CSR 20-7.031(1)(F)7*; or
 - b. The storm water discharges to a sinkhole or other direct conduit to groundwater.
6. This general permit does not authorize the placement of fill materials in flood plains, the obstruction of stream flow, directing storm waters across private property not owned or operated by the permittee, or changing the channel of a defined drainage course. This general permit is intended to address only the quality of the storm water runoff and minimize off-site migration of sediments and other water contaminants.
7. This general permit does not authorize any discharge to waters of the state of sewage, wastewaters, or pollutants such as:
 - a. Hazardous substances or petroleum products from an on-site spill or improper handling and disposal practices. (All containers must be properly closed to prevent spillage.);
 - b. Wash and/or rinse waters from concrete mixing equipment including ready mix concrete trucks unless such discharges are adequately treated and addressed in the Storm Water Pollution Prevention Plan;
 - c. Wastewater generated from air pollution control equipment or the containment of scrubber water in lined ponds; or
 - d. Domestic wastewaters, including gray waters.

* Identified or described in 10 CSR 20, Chapter 7. These regulations are available at many libraries and may be purchased from MDNR by calling the Water Pollution Control Program at (573)751-1300. The regulations are also available from the Missouri Secretary of States Office.

APPLICABILITY (continued)

8. MDNR reserves the right to deny coverage under this general permit to applicants for storm water discharges from land disturbance activities at sites that have contaminated soils that will be disturbed by the land disturbance activity or where such materials are brought to the site to use as fill or borrow. Such activities are normally covered by a site specific permit.
9. If at any time the Missouri Department of Natural Resources determines that the quality of waters of the state may be better protected by requiring the owner/operator of the permitted site to apply for a site specific permit, the Department may require any person to obtain a site specific operating permit [10 CSR 20-6.010 (13) and 10 CSR 20-6.200(5)].

The Department may require the permittee to apply for and obtain a site specific or different general permit if:

- a. The permittee is not in compliance with the conditions of this general permit;
- b. The discharge no longer qualifies for this general permit due to changed site conditions and regulations; or
- c. Information becomes available that indicates water quality standards have been or may be violated.

The permittee will be notified in writing of the need to apply for a site specific permit or a different general permit. When a site specific permit or different general permit is issued to the authorized permittee, the applicability of this general permit to the permittee is automatically terminated upon the effective date of the site specific or different general permit, whichever the case may be. The permittee shall submit the appropriate forms to the Department to terminate the permit that has been replaced.

10. Any owner/operator authorized by a general permit may request to be excluded from the coverage of the general permit and apply for a site specific permit [10 CSR 20-6.010 (13) and 10 CSR 20-6.200(6)].
11. This permit does not authorize land disturbance activity in jurisdictional waters of the U. S. as defined by the Army Corps of Engineers unless the permittee has obtained the required 404/401 permits.
12. This permit is not transferable to other owners or operators.

EXEMPTIONS FROM PERMIT REQUIREMENTS

1. Facilities that discharge all storm water runoff directly to a combined sewer system are exempt from storm water permit requirements.
2. Linear, strip, or ribbon construction (as described in 10 CSR 20-6.200,1.B.) on maintenance operations meeting one of the following criteria provided that water quality criteria are not exceeded:
 - a. Grading of existing dirt or gravel roads which does not increase the runoff coefficient and the addition of an impermeable surface over an existing dirt or gravel road;
 - b. Cleaning or routine maintenance of roadside ditches, sewers, waterlines, pipelines, utility lines or similar facilities.
 - c. Trenches two (2) feet in width or less; or
 - d. Emergency repair or replacement of existing facilities as long as best management practices are employed during emergency repairs.
3. Sites that disturb less than one acre of total land area that are not part of a common plan or sale and that do not cause any violations of water quality standards and are not otherwise designated by the department as requiring a permit, where water quality standards are not exceeded.
4. Agricultural storm water discharges and irrigation return flows. Animal Feeding Operations (AFO) are not included in the agricultural exemption.

REQUIREMENTS

Note: These requirements do not supersede nor remove liability for compliance with county and other local ordinances.

1. The discharge of storm water from these facilities shall not cause a violation of the state water quality standards, 10 CSR 20-7.031, which states, in part, that no water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:
 - a. Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;
 - b. Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
 - c. Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;
 - d. Waters shall be free from substances or conditions in sufficient amounts to have a harmful effect on human, animal or aquatic life;
 - e. There shall be no significant human health hazard from incidental contact with the water;
 - f. There shall be no acute toxicity to livestock or wildlife watering;
 - g. Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community; or
 - h. Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles, or equipment and solid waste as defined in Missouri's Solid Waste Law, Section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to Section 260.200 to 260.247 RSMO.
2. Good housekeeping practices shall be maintained on the site to keep solid waste from entry into waters of the state.
3. All fueling facilities present on the site shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers.
4. Hazardous wastes that are transported, stored, or used for maintenance, cleaning or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations.
5. An individual shall be designated by the permittee as responsible for environmental matters. The individual responsible for environmental matters shall have a thorough and demonstrable knowledge of the site's SWPPP and sediment and erosion control practices in general. The individual responsible for environmental matters or a designated inspector knowledgeable in erosion, sediment, and stormwater control principles, shall periodically inspect all structures that function to prevent pollution of waters of the state. These inspections shall be conducted in accordance with paragraph 10 of the Requirements.
6. All paint, solvents, petroleum products and petroleum waste products, and storage containers (such as drums, cans, or cartons) shall be stored according to Best Management Practices (BMPs). The materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers. All containers shall be inspected for leaks or spillage during the once per week inspection of Best Management Practices.
7. The primary requirement of this permit is the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). A copy of the SWPPP must be available on site when land disturbance operations are in progress, or other operational activities that may affect the maintenance or integrity of the BMP structures. The SWPPP must be made available to a department representative upon request. The SWPPP should not be submitted to the Department unless it is requested. The SWPPP must:
 - a. Incorporate required practices identified below;
 - b. Incorporate erosion control practices specific to site conditions; and
 - c. Provide for maintenance and adherence to the plan.

Before disturbing earth, or submitting an application, the permittee shall develop a SWPPP that is specific to the land disturbance activities at the site. This plan must be developed before a permit can be issued and made available as specified under the RECORDS section of this permit.

REQUIREMENTS (continued)

The permittee shall fully implement the provisions of the SWPPP required under this part as a condition of this general permit throughout the term of the land disturbance project.

The purpose of the SWPPP is to ensure the design, implementation, management, and maintenance of Best Management Practices in order to reduce the amount of sediment and other pollutants in storm water discharges associated with the land disturbance activities; comply with the Missouri Water Quality Standards; and ensure compliance with the terms and conditions of this general permit.

The permittee shall select, install, use, operate, and maintain appropriate BMPs for the permitted site. The following manuals are acceptable resources for the selection of appropriate BMPs.

Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices, (Document number EPA 832-R-92-005) published by the United States Environmental Protection Agency (USEPA) in 1992. **This manual is available at The USEPA internet site;** and

The latest version of ***Protecting Water Quality: A field guide to erosion, sediment and storm water best management practices for development sites in Missouri***, published by the Missouri Department of Natural Resources. This manual is available on the department's internet site at: <http://www.dnr.mo.gov/env/wpp/wpcp-guide.htm>

The permittee is not limited to the use of these guidance manuals. Other guidance publications may be used to select appropriate BMPs. However, all BMPs should be described and justified in the SWPPP. EPA and DNR continue to update BMP information on their web sites. It is recommended that the permittee review this information when developing a SWPPP.

8. SWPPP Requirements: The following information and practices shall be provided for in the SWPPP.
 - a. Site Description: In order to identify the site, the SWPPP shall include the facility and outfall information provided in the application form.
 - b. The SWPPP: The SWPPP shall have sufficient information to be of practical use to contractors and site construction workers to guide the installation and maintenance of BMPs. Site boundaries and outfalls shall be marked on a site map included as part of the SWPPP.
 - c. Selection Of Temporary And Permanent Non-Structural BMPs: The permittee shall select appropriate non-structural BMPs for use at the site and list them in the SWPPP. The SWPPP shall require existing vegetation to be preserved where practical. The time period for disturbed areas without vegetative cover shall be minimized to the maximum extent practicable. For sites that will be inactive six months or more, establishing a vegetative cover is a highly recommended choice for a proper BMP.

Examples of non-structural BMPs which the permittee should consider specifying in the SWPPP include: preservation of trees and mature vegetation, protection of existing vegetation for use as buffer strips (especially along drainage courses), mulching, sodding, temporary seeding, final seeding, geotextiles, stabilization of disturbed areas, preserving existing stream channels as overflow areas when channel straightening or shortening is allowed, soil stabilizing emulsions and tackifiers, mulch tackifiers, stabilized site entrances/exits, and other appropriate BMPs.

- d. Selection Of Temporary And Permanent Structural BMPs: The permittee shall select appropriate structural BMPs for use at the site and list them in the SWPPP. Examples of structural BMPs that the permittee should consider specifying in the SWPPP include: diverting flows from undisturbed areas away from disturbed areas, silt (filter fabric and/or straw bale) fences, earthen diversion dikes, drainage swales, sediment traps, rock check dams, subsurface drains (to gather or transport water for surface discharge elsewhere), pipe slope drains (to carry concentrated flow down a slope face), level spreaders (to distribute concentrated flow into sheet flow), storm drain inlet protection and outlet protection, reinforced soil retaining systems, gabions, temporary or permanent sediment basins, and other appropriate BMPs.
- e. Description Of Best Management Practices: The SWPPP shall include a description of both structural and non-structural BMPs that will be used at the site. The SWPPP shall provide the following general information for each BMP which will be used one or more times at the site:
 - i. Physical description of the BMP;
 - ii. Site and physical conditions that must be met for effective use of the BMP;
 - iii. BMP installation/construction procedures, including typical drawings; and
 - iv. Operation and maintenance procedures for the BMP.

The SWPPP shall provide the following information for each specific instance where a BMP is to be installed:

- i. Whether the BMP is temporary or permanent;
 - ii. Where, in relation to other site features, the BMP is to be located;
 - iii. When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project; and
 - iv. What site conditions must be met before removal of the BMP if the BMP is not a permanent BMP.
- f. Disturbed Areas: Slopes for disturbed areas must be defined in the SWPPP. A site map or maps, defining the sloped areas for all phases of the project, must be included in the SWPPP. Where soil disturbing activities cease in an area for 14 days or more, the permittee shall construct BMPs to establish interim stabilization. Interim stabilization shall consist of well established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. These BMPs may include a combination of sediment basins, check dams, sediment fences, and mulch. The types of BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes. If the slope of the area is greater than 3:1 (3 feet horizontal to 1 foot vertical) or if the slope is greater than 3% and greater than 150 feet in length, then the permittee shall establish interim stabilization within 7 days of ceasing operations on that part of the site.
- g. Installation: The permittee shall ensure the BMPs are properly installed at the locations and relative times specified in the SWPPP. Peripheral or border BMPs to control runoff from disturbed areas shall be installed or marked for preservation before general site clearing is started. Storm water discharges from disturbed areas, which leave the site, shall pass through an appropriate impediment to sediment movement, such as a sedimentation basin, sediment traps, silt fences, etc. prior to leaving the land disturbance site. A drainage course change shall be clearly marked on a site map and described in the SWPPP. The location of all BMPs must be indicated on a site map, included in the SWPPP.
- h. Sedimentation Basins: The SWPPP shall require a sedimentation basin for each drainage area with 10 or more acres disturbed at one time. The sedimentation basin shall be sized to contain a volume of at least 3600 cubic feet per each disturbed acre draining thereto. Accumulated sediment shall be removed from the basin as needed to ensure proper operation. Discharges from the basin shall not cause scouring of the banks or bottom of the receiving stream. The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.
- Where use of a sediment basin of this size is impractical, the SWPPP shall evaluate and specify other similarly effective BMPs to be employed to control erosion and sediment delivery. These similarly effective BMPs shall be selected from appropriate BMP guidance documents authorized by this permit. The BMPs must provide equivalent protection. The SWPPP shall require both temporary and permanent sedimentation basins to have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.
- i. Additional Site Management BMPs: The SWPPP shall address other BMPs, as required by site activities, to prevent contamination of storm water runoff. Such BMPs include:
- i. Solid and hazardous waste management including: providing trash containers and regular site clean up for proper disposal of solid waste such as scrap building material, product/material shipping waste, food containers, and cups; and providing containers and proper disposal of waste paints, solvents, and cleaning compounds, etc.;
 - ii. Provision of portable toilets for proper disposal of sanitary sewage;
 - iii. Storage of construction materials away from drainage courses and low areas; and
 - iv. Installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers.
- j. Dewatering: The SWPPP shall require a description of any anticipated dewatering methods, including the anticipated volume of water to be discharged and the anticipated maximum flow discharged from these dewatering activities, expressed in gallons per minute. Maximum flow may be stated in the SWPPP as an estimate based on the type and capacity of equipment being used for dewatering. The SWPPP shall call for specific BMPs designed to treat water pumped from excavations and in no case shall this water be pumped off site without being treated by the specified BMPs.
- k. Roadways: Where applicable, upon installation of or connection to roadways, all efforts should be made to prevent the deposition of earth and sediment onto roadways through the use of proper BMPs. Where sediment is present on roadways all storm water curb inlets shall have inlet protection. Where storm water will flow off the end of where a roadway terminates, a sediment catching BMP (ex. gravel berm, silt fence, etc.) shall be provided. Roadways and curb inlets shall be cleaned weekly and following a rainfall that generates a run-off. Stabilized construction entrances shall be used to prevent sediment track-out.

9. Amending/Updating the SWPPP: The permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. The permittee shall amend the SWPPP, at a minimum, whenever the:
 - a. Design, operation, or maintenance of BMPs is changed;
 - b. Design of the construction project is changed that could significantly affect the quality of the storm water discharges;
 - c. Permittee's inspections indicate deficiencies in the SWPPP or any BMP;
 - d. MDNR notifies the permittee in writing of deficiencies in the SWPPP;
 - e. SWPPP is determined to be ineffective in significantly minimizing or controlling erosion and sedimentation (e.g., there is visual evidence, such as excessive site erosion or excessive sediment deposits in streams or lakes);
 - f. Settleable Solids from a storm water outfall exceed 2.5 mg/L/hr;
 - g. MDNR determines violations of Water Quality Standards may occur or have occurred.
10. Site Inspections Reports: The permittee (or a representative of the permittee) shall conduct regularly scheduled inspections at least once per seven calendar days. These inspections shall be conducted by the person responsible for environmental matters at the site, or a person trained by and directly supervised by the person responsible for environmental matters at the site. For disturbed areas that have not been finally stabilized, all installed BMPs and other pollution control measures shall be inspected for proper installation, operation and maintenance. All storm water outfalls shall be inspected for evidence of erosion or sediment deposition. Any structural or maintenance problem shall be noted in an inspection report and corrected within seven calendar days of the inspection. If a rainfall event results in storm water runoff on site, the BMPs must be inspected within a reasonable time period (not to exceed 48 hours) after the rainfall event has ceased. The SWPPP must explain how the person responsible for erosion control, will be notified when storm water runoff occurs. If weather conditions make it impossible to correct the problem within seven days, a detailed report, including pictures, must be filed with the regular inspection reports. The permittee shall correct the BMP problem as soon as weather conditions allow. Parts of the site that have been finally stabilized must be inspected at least once per month.

A log of each inspection and copy of the inspection report must be retained on the construction site while on-site construction workers are present, and made available to the Department upon request. The inspection report is to include the following minimum information: inspector's name, date of inspection, observations relative to the effectiveness of the BMPs, actions taken or necessary to correct the observed problem, and listing of areas where land disturbance operations have permanently or temporarily stopped. The inspection report shall be signed by the person designated in the SWPPP to conduct the inspections.

11. Proper Operation and Maintenance: The permittee shall at all times maintain all pollution control measures and systems in good order to achieve compliance with the terms of this general permit.
12. Notification to All Contractors: The permittee shall be responsible for notifying each contractor or entity (including utility crews and city employees or their agents) who will perform work at the site of the existence of the SWPPP and what action or precautions shall be taken while on site to minimize the potential for erosion and the potential for damaging any BMP. The permittee is responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.
13. Public Notification: The permittee shall post a copy of the public notification sign described by the MDNR at the main entrance to the site. The public notification sign must be visible from the public road that provides access to the site's main entrance. The public notification sign must remain posted at the site until the permit has been terminated.

OTHER DISCHARGES

1. Hazardous Substance and Oil Spill Reporting: Refer to Section B, #14 of Part I of the Standard Conditions that accompany this permit.
2. Removed substances: Refer to Section B, #6 of Part I of the Standard Conditions that accompany this permit.
3. Change in discharge: In the event soil contamination or hazardous substances are discovered at the site during land disturbance activities, the permittee shall notify the MDNR regional office by telephone as soon as practicable and no later than 24 hours after discovery. The permittee must also notify the MDNR regional office in writing no later than 14 calendar days after discovery.

SAMPLING REQUIREMENTS AND EFFLUENT LIMITATIONS

1. Discharges shall not violate General Water Quality Standards 10 CSR 20 7.031(3).
Settleable Solids shall not exceed a maximum of 2.5 ml/L/hr. for each storm water outfall.
2. There are no regular sampling requirements in this permit. However, the Department may require sampling and reporting as a result of illegal discharges, compliance issues, complaint investigations, or other such evidence of off site contamination from activities at the site. If such an action is needed, the Department will specify in writing any additional sampling requirements, including such information as location, extent, and parameters.

RECORDS

1. The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site named in the State Operating Permit, results of any monitoring and analysis, and all site inspection records required by this general permit. The records shall be accessible during normal business hours. The records shall be retained for a period of at least three years from the date of the Letter of Termination.
2. The permittee shall provide a copy of the SWPPP to MDNR, USEPA, or any local agency or government representative if they request a copy in the performance of their official duties.
3. The permittee shall provide those who are responsible for installation, operation, or maintenance of any BMP a copy of the SWPPP. The permittee, their representative, and/or the contractor(s) responsible for installation, operation, and maintenance of the BMPs shall have a current copy of the SWPPP with them when on the project site.

LAND PURCHASE AND CHANGE OF OWNERSHIP

1. Individual Lot or Lots: Federal and Missouri storm water regulations (10 CSR 20-6.200) require a storm water permit and erosion control measures for one (1) or more acres of land disturbance that is a part of a common plan or sale. If the permittee sells less than 1 acre of the permitted site to an entity for, commercial, industrial, or residential use, (unless sold to an individual for the purpose of building his/her own private residence) this land remains a part of the common sale and regulated by this permit. Therefore, the permittee is still responsible for erosion control on the sold property until termination of the permit.
2. If the permittee sells 1 or more acres of the permitted site to an entity, the new owner of the property must obtain a land disturbance permit for the purchased property. The original permittee must amend the SWPPP to show that the property (one acre or more) has been sold and therefore no longer under the original permit jurisdiction.
3. If a lot is sold to an individual for purposes of building his/her own private residence, the permittee is no longer responsible for erosion control on the lot. However, Section 644.051.1(1) RSMO still gives the department the authority to hold the individual owner responsible for erosion control measures on the lot if it is deemed necessary to protect waters of the state.
4. Entire Tract: If the entire tract is sold to a single entity, then this permit shall be terminated when the new owner obtains a new land disturbance permit for the site.

TERMINATION

This permit may be terminated when the project is stabilized. The project is considered to be stabilized when either perennial vegetation, pavement, buildings, or structures using permanent materials cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetative cover shall be at least 70% of fully established plant density over 100% of the disturbed area.

In order to terminate the permit, the permittee shall notify MDNR by submitting Form H, included with the State Operating Permit. The permittee shall complete Form H and mail it to MDNR at the address noted in the cover letter of this permit.

This general permit will expire five years from the effective date of the permit (see page 1). The issue date is the date the State Operating Permit is issued to the applicant. The expiration date may or may not coincide with the date the authorized project or development is scheduled for completion.

If the project or development completion date will be after the expiration date of this general permit, then the permittee must reapply to the Department for the permit to be re-issued. The permittee will receive notification of the expiration date of the permit before the expiration date listed on page 1 of this permit. In order for the permit to be re-issued, the permittee should submit the appropriate application form(s) at least 180 days before the expiration of the permit if land disturbance activity is expected to continue past the expiration date of this general permit.

If the permittee does not apply for the renewal of this permit, this permit will automatically terminate on the expiration date. Continued discharges from a site that has not been fully stabilized are prohibited beyond the expiration date; unless the permit is reissued or the permittee has filed a timely application for the reissuance of this permit. Failure to maintain a valid permit for the life of the project until permit termination, is a violation of the State and Federal Clean Water Law.

DUTY TO COMPLY

The permittee shall comply with all conditions of this general permit. Any noncompliance with this general permit constitutes a violation of Chapter 644, Missouri Clean Water Law, and 10 CSR 20-6.200. Noncompliance may result in enforcement action, termination of this authorization, or denial of the permittee's request for renewal.

MAILING ADDRESS

The permittee shall send all written correspondence and forms, which are to be submitted to MDNR to the address listed in the cover letter that accompanies this permit.



**Fort Leonard Wood
Directorate of Public Works
Environmental Division**



Land Disturbance Permit Compliance Self Certification

**The permit listed below is in compliance with all stipulations of the State of Missouri
Land Disturbance Permit:**

Permit Number: _____

Project Name or Description: _____

Project Bldg Number or Location: _____

Contract Number: _____
(if applicable)

I certify that all of the Best Management Practices, including performing Weekly Site Inspections, under this State of Missouri Land Disturbance Permit are currently maintained in compliance with applicable federal law (40 CFR Section 319 of the Federal Clean Water Act) and the site specific Storm Water Pollution Prevention Plan.

Check only one:

___ There are **no** outstanding compliance issues remaining on this site.

___ There are compliance issues which will be corrected within seven days per the Permit.

Print and Sign
Land Disturbance Permit
Continuing Authority

Compliance Self Certification Date

Print and Sign
Land Disturbance Site Manager
(if applicable)

Compliance Self Certification Date

This Certification must be submitted to the following address within 15-days from the end of each month until the Permit is terminated by the Missouri Department of Natural Resources:

Fort Leonard Wood Directorate of Public Works
Environmental Compliance Branch (LMNE-LNW-PWEE)
Storm Water Program Manager
1334 First Street
Fort Leonard Wood, MO 65473

Conceptual Aesthetic Considerations

The conceptual intent for the buildings in the Warriors in Transition Complex is to provide a campus like atmosphere consistent with the existing hospital complex to the West of the project site (See Photograph #1). To meet these considerations the D/B Contractor should match the brick and concrete found on the existing hospital. (See Photograph #2) The brick used shall have the same texture and size as used on the hospital. Mortar joints shall be the same style and color as the existing on the hospital.



Photograph #1.



Photograph #2

Buildings on the Warriors in Transition Complex shall have sloped metal roofs that are consistent with the style and colors of Photographs #3 and #4.



Photograph#3



Photograph #4

For the bus stop that is included in the complex, refer to Photograph #5 for the base preferred style and color.



Photograph #5

Appendix

Spatial Data Standard for Facilities, Infrastructure and Environment (SDSFIE) Guide for GIS Deliverables Created as Part of Military Design and Construction Projects

Fort Leonard Wood, Missouri

Introduction

This Appendix provides guidance for implementing Engineering and Construction Bulletin (ECB) No. 2006-15, “Standardizing Computer Aided Design (CAD/CADD) and Geographic Information Systems (GIS) Deliverables for all Military Design and Construction Projects” (http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2006_15.pdf). This guidance establishes the requirements for geospatial data deliverables produced as part of design, design-build, or design-bid-build contracts for Fort Leonard Wood, Missouri. It includes description of the:

- Coordinate System and Datums;
- Data Quality Standard;
- Deliverables;
- SDSFIE-Compliant GIS Deliverable Specification; and
- Metadata.

Coordinate System and Datums

All geospatial deliverables (CADD or GIS format), whether obtained via survey or any other data collection process, shall be measured in meters. The coordinate system for all geospatial data will be UTM Zone 15. The vertical datum, if applicable, will be North American Vertical Datum 1988 (NAVD 88). The horizontal datum will be WGS84.

Precise specifications of the UTM Coordinate System, are as follows:

Grid Coordinate System Name: Universal Transverse Mercator

UTM Zone Number: 15

Transverse Mercator Projection

Scale Factor at Central Meridian: 0.999600

Longitude of Central Meridian: -93.000000

Latitude of Projection Origin: 0.000000

False Easting: 500000.000000

False Northing: 0.000000

Planar Coordinate Information

Planar Distance Units: meters

Coordinate Encoding Method: coordinate pair

Coordinate Representation

Abscissa Resolution: 0.000032

Ordinate Resolution: 0.000032

Geodetic Model

Horizontal Datum Name: D_WGS_1984

Ellipsoid Name: WGS_1984

Semi-major Axis: 6378137.000000

Denominator of Flattening Ratio: 298.257224

Data Quality StandardAs Built Survey

An as-built condition survey should be performed to capture the information listed in this Appendix. All relevant features shall be identified on as-built drawings and shall be GPS or conventional surveyed to the level of accuracy specified below.

Coordinate Accuracy

The Contractor shall use conventional surveying and other methods, such as a total station or GPS for field data collection at an accuracy level in accordance with “Geospatial Positioning Accuracy Standards, Part 4: Architecture, Engineering Construction, and Facilities Management. Published by the FGDC and available at

http://www.fgdc.gov/standards/standards_publications/index.html.

Horizontal and vertical accuracy of features, where vertical coordinates are collected, shall be +/- 2cm.

Surveyor Certification Requirement

The surveyor shall verify the survey for accuracy and a statement will be provided to the government stating the level of accuracy for the data being reported (in metric units). In addition to the accuracy statement, the following information should be provided in a survey report:

- Coordinate system & datum used;
- Projection;

- Units of measure (vertical and horizontal);
- Attribute description (GPS data dictionary—features, attributes and attribute values);
- Source - Receiver type, antenna type, receiver settings, number of positions per point feature, correction method and any field other relevant field procedures utilized;
- Survey method;
- Equipment list;
- Calibration documentation;
- Description of control points and control diagrams;
- Field notes; and
- Field-collected data (in addition to the post-processed final data used to prepare the geospatial data deliverable).

Utilities

Underground and aboveground utility lines shall be surveyed at a minimum of two points along every straight run, at every change of direction, at every tie in point, and at any change in line size.

Deliverables

The intent of the deliverable set is to provide the Installation with comprehensive geospatial information about the facility footprint and site features that exist outside the building(s). The electronic deliverables must be in the file format and data standard used by the Installation's Operations and Maintenance System (as noted in "Coordinate System and Datums", above).

The Installation requires deliverables in the following software formats:

- GIS Files
 - ESRI geodatabase file.
 - The coordinate system, projection, datum(s) and units will be defined for the layer and will be documented in the metadata.
 - Where captured, vertical coordinate information will be stored as a feature attribute as meters above mean sea level. Polygon-z, polyline-z, and point-z formatted files are not requested.
- CADD Files
 - MicroStation DGN files in A/E/C CADD format, using the coordinate system, projection, datum, and units specified in the RFP.

100% Design (Design Complete)

Final design deliverables for each design package should consist of (A) the drawings and specifications, and (B) the GIS file(s):

- 100% complete drawings, specifications, calculations/design analysis, and a list of all comments and their resolution for that work package. All final design drawings will be in the A/E/C CADD Standard format, current version as agreed upon by the government and the contractor. The A/E/C CADD Standard is available at <https://tsc.wes.army.mil/products/standards/aec/aecstdweb.asp>. Metadata shall be delivered with each CADD file, and will meet the standard specified in this Appendix.
- A corresponding SDSFIE-compliant GIS deliverable for the feature layers listed in Table 1 of this Appendix. For each listed layer the contractor should provide either a GIS deliverable or a statement that no features in that layer will be constructed, be modified, or pose a design constraint for the project. The SDSFIE standard is available at <http://www.sdsfie.org>. Metadata shall be delivered with each GIS data layer and will meet the standard specified in this Appendix.

As-Built (Construction Complete)

Final construction deliverables shall consist of (A) the as built drawings and specifications, and (B) the GIS file(s). The contractor will provide a submittal of the CADD and GIS files that depict the as-built condition of the site. The data layers to be delivered, the coordinate accuracy of the features, the required attribution, and the metadata will meet the standards specified in this Appendix.

For each layer listed in Table 1, the contractor will provide either a GIS deliverable or a statement that no features in that layer were constructed or modified. The tie in to a utility main line is considered a modification of the utility main line, and the portions of main lines that were exposed should therefore be included in the deliverable.

SDSFIE-Compliant Deliverable Specification

Geodatabase Template

Upon request the government will provide the contractor with an SDSFIE-compliant GIS layer template to be used for populating the GIS deliverables required under the contract. The contractor shall populate the layers without modifying the template. The contractor shall ensure that layers to be delivered but not included in the template, should the template not be complete, are fully compliant with the current SDSFIE standard.

There may be circumstances in which SDSFIE compliance cannot be maintained. In such circumstances, proposed deviations with the standard must be communicated by the contractor and reviewed by the government. Approval for the deviation shall be documented.

Data Integrity Check

The contractor shall utilize a topology build and clean routine and assure the following:

- No erroneous overshoots, undershoots, dangles or intersections in the line work;
- Lines should all be continuous, i.e. do not create dashed lines with many small line segments;
- Point features should be digitized as points, not graticules, cells, symbols or icons;
- No sliver polygons;
- All polygons completely close and have a single unique centroid; and
- Digital representation of the common boundaries for all graphic features must be coincident, regardless of feature layer.

Required GIS Data Layers and Required Attributes

Table 1 lists the SDSFIE-compliant GIS data layers that are to be delivered as part of this contract. The list is based on a review of the type(s) of facility(s) being constructed. However, it is possible that some layers in the list will not be used.

Metadata

The contractor shall prepare metadata conforming to the most current version of the Federal Geospatial Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM) at http://www.fgdc.gov/standards/standards_publications. Appendix A of the ECB, http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2006_15.pdf, is the FGDC metadata profile for Army Installations and should be followed as closely as possible. An ESRI Metadata Stylesheet for Army Geospatial Data is posted at <https://gis.hqda.pentagon.mil>. Metadata content will accompany all electronic geospatial data submissions. This includes both CADD and GIS formats. A metadata file shall accompany, at minimum, each CADD data set and/or each GIS data set. Metadata should be prepared to FGDC standards and delivered in XML format readable by software applications that use the FGDC XML format standard (such as ESRI ArcMap 9.x).

Table 1. SDSFIE Layer Names and Required Attributes.

Note: Required attributes, where specified, are listed following the SDSFIE layer name. Elevation information, reported as meters above mean sea level, is required for layers where “coord_z” is listed as a required attribute.

airfield_light_point

airfield_surface_centerline

airfield_surface_edge_line

airfield_surface_marking_area

airfield_surface_marking_line

airfield_surface_site

area_size (acres); area_u_d (area unit of measure, acres); perim (meters); perim_u_d (perimeter unit of measure, meters); coord_x (centroid, WGS84 UTM); coord_y (centroid, WGS84 UTM); paved_d (paved code, Yes/No); feat_name (airfield name)

athletic_court_area

athletic_field_area

athletic_miscellaneous_area

borrow_area

breakline

building_floor_area

building_room_area

building_space_area

canopy_pavilion_site

communications_amplifier_point

communications_antenna_site

coord_X (WGS84 UTM), coord_y (WGS84 UTM), area_size(acres), area_u_d(area unit of measure), perim(perimeter dimension, meters), perim_u_d(perimeter unit of measure, meters)

communications_coaxial_line

communications_device_point

communications_equip_point

communications_fiberoptic_line

communications_handhole_point

communications_manhole_site

communications_pedestal_site

communications_splitter_point

communications_telephone_point

communications_terminator_point

communications_twisted_pair_line

communications_vault_site

Table 1. Continued

compressed_air_pipe_line
 control_point
 culvert_centerline
 curb_line
 digital_elevation_model_point
 easement_right_of_way_area
 electrical_cable_line
 dispostn_d (disposition code, domain); instl_ty_d (installation type code, domain)
 electrical_capacitor_point
 electrical_ductbank_line
 electrical_generator_point
 electrical_junction_site
 electrical_meter_point
 electrical_motor_point
 electrical_pedestal_point
 electrical_regulator_point
 electrical_substation_site
 dispostn_d (disposition code, domain); sst_ty_d (type of service label, domain)
 electrical_switch_point
 electrical_transformer_bank_point
 electrical_transformer_vault_point
 elevation_contour_line
 fence_line
 fuel_fitting_point
 fuel_flow_direction_arrow
 fuel_hydrant_point
 fuel_junction_site
 fuel_line
 fuel_meter_point
 fuel_pump_booster_station_point
 fuel_source_point
 fuel_tank_site
 gate_line
 gate_point
 hazardous_materiels_storage_area
 hsb_cat_d (the general nature of hazardous waste, domain); area_size (acres);
 area_u_d (area unit of measure, acres); perim (perimeter dimension), perim_u_d (meters);
 coord_x (WGS84 UTM); coord_y (WGS84 UTM);

Table 1. Continued

hazardous_materiels_storage_location_site
 heat_cool_anchor_point
 heat_cool_flow_direction_arrow
 heat_cool_junction_site
 heat_cool_line
 heat_cool_marker_point
 heat_cool_meter_point
 heat_cool_plant_area
 heat_cool_pump_point
 heat_cool_rectifier_point
 heat_cool_regulator_point
 heat_cool_valve_point
 hospital_structure_site
 industrial_waste_fitting_point
 industrial_waste_flow_direction_arrow
 industrial_waste_grit_chamber_point
 industrial_waste_junction_point
 industrial_waste_lagoon_area
 industrial_waste_line
 industrial_waste_meter_point
 industrial_waste_neutralizer_point
 industrial_waste_oil_water_separator_site
 industrial_waste_tank_point
 industrial_waste_treatment_plant_area
 industrial_waste_valve_point
 natural_gas_fitting_point
 natural_gas_flow_direction_arrow
 natural_gas_junction_point
 natural_gas_light_point
 natural_gas_line
 natural_gas_marker_point
 natural_gas_meter_point
 natural_gas_rectifier_point
 natural_gas_regulator_reducer_point
 natural_gas_valve_point
 pedestrian_sidewalk_centerline
 pipeline_line
 piprod_d (pipeline product code, domain); oper_nm (operator name, mixed case)

Table 1. Continued

radar_site
 railroad_bridge_centerline
 railroad_centerline
 tot_len (total length of track, meters); length_u_d (length unit of measure, meters);
 feat_name (name of railroad, mixed case); cond_d (condition
 code, domain); traf_vol_d (traffic volume code, domain)
 railroad_feature_point
 railroad_station_site
 railroad_yard_area
 recreation_park_area
 recreation_trail_centerline
 regulated_aboveground_storage_tank_site
 regulated_storage_tank_farm_area
 regulated_underground_storage_tank_site
 road_bridge_area
 road_bridge_centerline
 road_centerline
 category_d; num_lanes; feat_len; length_u_d; feat_name; road_name; alt_name;
 rou1_typ_d; rou1_name; rou2_typ_d; rou2_name; rou3_typ_d; rou3_name
 road_feature_point
 road_guardrail_line
 road_site
 slab_area
 solid_waste_compactor_point
 solid_waste_dump_area
 solid_waste_incinerator_point
 solid_waste_landfill_area
 solid_waste_material_recovery_facility_point
 solid_waste_stockpile_area
 solid_waste_transfer_station_point
 spill_containment_feature_area
 spill_containment_tank_point
 spot_elevation_point
 storm_culvert_site
 storm_sewer_armor_point
 storm_sewer_culvert_line
 storm_sewer_downspout_point
 storm_sewer_fitting_point

Table 1. Continued

storm_sewer_flood_area
storm_sewer_flow_direction_arrow
storm_sewer_headwall_line
storm_sewer_inlet_point
storm_sewer_junction_point
storm_sewer_line
storm_sewer_oil_water_seperator_site
storm_sewer_open_drainage_area
storm_sewer_open_drainage_line
storm_sewer_pump_point
storm_sewer_reservoir_point
structure_existing_site
structure_future_site
tower_site
tunnel_centerline
utility_electric_utility_site
utility_pole_guy_point
utility_pole_tower_point
utility_pole_tower_site
vehicle_parking_area
wastewater_discharge_point
wastewater_filtration_bed_area
wastewater_fitting_point
wastewater_flow_direction_arrow
wastewater_grease_trap_point
wastewater_grit_chamber_point
wastewater_junction_point
wastewater_lagoon_area
wastewater_line
wastewater_neutralizer_point
wastewater_oil_water_separator_site
wastewater_pump_ejector_station_site
wastewater_pump_point
wastewater_septic_tank_point
wastewater_treatment_plant_site
wastewater_valve_point
water_fire_connection_point
water_fitting_point

Table 1. Continued

water_hydrant_point
water_junction_point
water_line
water_marker_point
water_meter_point
water_pump_point
water_regulator_reducer_point
water_reservoir_area
water_tank_site
water_valve_point
water_vent_point

11.4 EXTERIOR SIGN STANDARD

Signs have a major effect on the appearance of Fort Leonard Wood and the professionalism of its units. The number of signs on the installation shall be held to the absolute minimum required for directions, identification, and customer service. This section establishes standards for standardizing sign material, color, style, types, and placement throughout the installation.

Standardized signage systems facilitate movement, provide a sense of orientation, and reinforce standards of excellence and visually communicate information. Signs are highly visible features that must be attractive and compatible with their surroundings. Careful consideration must be given to what a sign says, how it is said, its visual appearance and organization, its location, structural support system, and relation to other signs within the installation.

Signage creates a unifying element throughout FLW that visually ties the installation visual zones and themes together and builds a reference and continuity that translates into confidence and reassurance when traveling throughout the installation. The standards to apply for signage color, type, and sizing are found in [Technical Manual \(TM\) 5-807-10, *Signage*](#) (See Section 9, [paragraph 9.6 Pavement Marking Standards](#)).

11.4.1 Sign System Characteristics

There are several basic design characteristics that, by serving to convey necessary information clearly and attractively, are an integral part of any successful signage system. These characteristics are:

Simplicity: Provide only needed information, avoid redundancy, and eliminate over-signing with resultant clutter and visual confusion. Sign messages must be clear, simple, and easy for individuals to process quickly.

Continuity: The system will be applied uniformly and consistently throughout the entire installation. The importance of consistent implementation extends from the larger issues of sign type and size down to accurate color continuity and matching typestyles.

Visibility: Signs will be located at significant decision points and oriented to provide clear sight lines for the intended user. Coordinate locations with respect to landscaping, utilities, adjacent

signage, and various other street design elements to ensure long-term maximum visibility.

Legibility: Sign typestyle, line spacing, color, and size all combine to create the crucial design characteristics of legibility. Sign design will take into consideration users such as motorist, pedestrians, or bicyclists and the relative travel speed at which each type of user will be traveling when viewing the signs.

11.4.2 Vocabulary-Communications

A common language has been created for establishing a signing system. The different components that create the sign package have been named and referred to within the total signing system.

The creation of a "signage language" helps generate a unified bond within sign types that make up a signage family. This signage language may be considered in terms of the following:

- Information or Message
- Typography
- Presentation: height, shape, style, color, materials and graphics
- Architectural Influence: 3D qualities of the sign and the method of support such as a masonry base unit
- Graphic Architecture: the placement of the letters and artwork within the sign panel and their relationship to each other.

11.4.3 Types of Exterior Signs

There are six basic categories of exterior signs: Identification, Motivation, Guide, Mandatory/Prohibitory, Information, and Regulatory signs.

11.4.3.1 Identification Signs

There are four basic types of identification signs: Installation, Military Headquarters, Military Facility, and Community Facility Identification signs. These are signs that identify entrances to the installation, areas within the installation, major tenants, buildings, and organizational or functional components. They identify a location, and greet the visitor to that location. They should be compatible in scale and character with the architecture and also blend with the natural surroundings.

Wall mounted identification signs may be used instead of freestanding signs. Wall mounted signs eliminate visual clutter and minimize maintenance.

These signs are designed to include the following:

Typeface: Lettering is self-adhesive backing material.

- Building Title: Helvetica Medium, Upper and lower case
- Building Addresses: Helvetica Medium, Upper and lower case

Color:

- Panel: Dark Brown (Pantone 18-1027 TPX. See Supplemental Page L-4a)
- Lettering: White
- Post: Dark Brown
- Exposed panel backs and edges: Dark Brown
- All paint: Semi gloss

Materials

- Panel: Double-face 1/8" thick aluminum
- Post: Steel Pipe
- Foundation: Concrete pier or direct burial

See [Technical Manual \(TM\) 5-807-10, Signage](#), for further sign specifications and for sign placement guidelines.

11.4.3.1.1 Installation Identification Signs

Installation identification signs name the installation and display the official US Army plaque. The designation "United States Army" must appear at the top of the sign in accordance with [AR 420-70](#), para 2-7h. Every installation entrance shall have an installation identification sign displaying only the US Army plaque, with the words "United States Army, Fort (Name of Fort), and gate name as indicated in Figure 11.22, Installation Entrance Signs. The placement of Senior Mission Commander logo, unit crest, and other installation identification signs, monuments, or displays shall be located inside the installation beyond the cleared area of the Access Control Point (ACP) of entry. When used service-wide, these signs convey a uniform image of strength and



Fig. 11.22 – U.S. Army Standard Installation Entrance Sign

stability to the public. Emblems, branch colors, unit mottos, names, and titles of individuals are not to be displayed.

Installation identification signs consist of three types:

Sign Type A1 - Main Entrance Sign identifies the principal visitor entrance.

Sign Type A2 - Secondary Entrance Sign identifies entry points with relatively high volumes of visitor traffic.

Sign Type A3 - Limited Access Entry Gate Sign identifies entry points with limited public access.

See [Technical Manual \(TM\) 5-807-10, Signage](#), paragraph 3-3, for sign specifications and paragraph 3-11 for sign placement guidelines.

11.4.3.1.2 Military Headquarters Identification Signs

Military head-quarters identification signs identify military activities and facilities and carry unit name information and street addresses (Fig. 11.23).

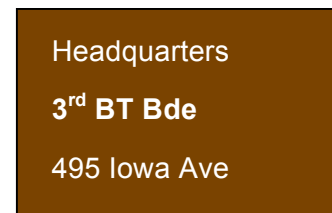


Fig. 11.23 – Headquarters Identification Sign

Military headquarters identification signs consist of four types:

Sign Type B1 - Installation Headquarters Sign identifies the central administration of the installation.

Sign Type B2 - Command, Division, and Brigade Headquarters Sign

Sign Type B3 - Battalion Headquarters Sign

Sign Type B4 - Headquarters Building Entrance Sign identifies the building entrance for all levels of authority. In addition, Type B4 is used to identify a unit headquarters that has a special entry point other than the main entrance of a building.

Name plate attachments are prohibited. Insignias, emblems, branch colors, unit mottos, names, or titles of individuals will not be used on these signs.

Identify buildings with either a free-standing or building-mounted sign, but not both. Building mounted signs are preferred. Free-standing building identification signs should be kept to a minimum. A primary objective of the installation orientation system is to reduce the number of signs and to eliminate the visual clutter that results from the over use of signage. Locate signs only where they are needed to provide orientation. As a general rule, provide one sign for each building. An option to the standard building identification sign is the use of facility-mounted, individual letter-type signs affixed to the buildings. The size and location of these signs should be standardized throughout the installation, normally over the building main entrance. See Figure 11.24.

These signs are designed to include the following:

Typeface: The letter shall be mounted to the wall according to the manufacturers' specifications.

- Building Lettering Size: 2mm to 25mm (1/16" to 1") deep, Helvetica medium typeface.
- The depth separates them from the plane of the wall and gives them a crisp appearance, while the Helvetica medium typeface relates to other Army signs.

Color:

- The color or finish of the letters should compliment the predominant color of the building while providing enough contrast with the background for visibility.
- Use a light-color or bright metallic finish for the lettering on dark buildings and a standard brown or dark bronze finish for the lettering on light colored buildings.

Materials:

- Several letter materials are available through sign manufacturers; however, rigid foam with aluminum facing is the preferred letter material.
- Letter material should be selected based on durability, architectural compatibility, and cost effectiveness.

11.4.3.1.3 Military Facility Identification Signs

Military facility identification signs are used to identify company level organizations and other military facilities not included in the

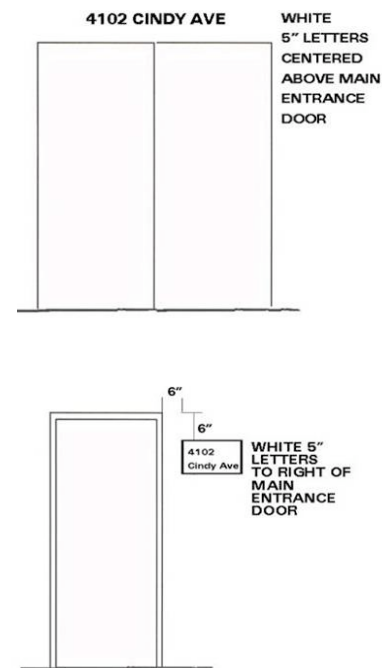


Fig. 11.24 - Street Address Location at Entrance Doors

installation identification or military headquarters sign types. Insignias, emblems, branch colors, unit mottos, names, or titles of individuals will not be used on these signs.

Military facility identification signs consist of seven types:

Sign Type C1 - Centralized Primary Facility Sign, identifies multiple service units in one or a complex of buildings. In addition, one service unit comprised of sub-services which are used by a large volume of military and civilian personnel may be identified by Type C1.

Sign Type C2 - Centralized Secondary Facility Sign, may be used where the volume of civilian traffic does not warrant the use of sign Type C1, such as military unit storage facilities.

Sign Type C3 - Primary Facility Sign, identifies a large scale facility serving a large volume of military and civilian personnel, but does not list individual services units or sub-services.

Sign Type C4 - Secondary facility Sign identifies company level organizations and individual service units.

Sign Type C5 - Primary Entrance Sign identifies the main entry points of a service facility.

Sign Type C6 - Secondary Entrance Sign, identifies the same information as Type C5, but is smaller in size.

Sign Type C7 - Restricted Facility Sign identifies the facility name or area which is restricted.

11.4.3.1.4 Community Facility Identification Signs

These identify activities and facilities used for non-military purposes. The standards for community signs also apply to signs for private firms operating on base. AAFES facilities and nationally recognized food chain franchises operated by AAFES may utilize their individual registered trademark signage in general compliance with these standards. These signs should be kept at a low profile and design and color should match the installation-wide system.

Community identification signs consist of seven types:

Sign Type D1 - Centralized Primary Facility Sign identifies several activities or organizations in one or a complex of buildings.

Sign Type D2 - Primary Facility with Changeable Message Board identifies an individual organization or facility and provides a changeable message board for information on activities.

Sign Type D3 - Primary Facility Sign identifies an organization.

Sign Type D4 - Secondary Facility Sign, identifies the same information as Type D3, but is smaller in size.

Sign Type D5 - Building Entrance Sign identifies the facility entrance and hours of operation.

Sign Type D6 - Recreation Facility Sign identifies an outdoor recreation or park facility and hours of operation.

Sign Type D7 - Bus Stop Sign identifies bus routes, stops, and schedules.

1

1.4.3.2 Motivation Signs

These signs are used to boost morale, improve safety, aid in recruiting, and accomplish other special objectives. Motivation signs are unique in appearance and do not have specified graphic layouts.

Motivation signs include three types:

Sign Type E1 - Installation Motivation Sign identifies the principle commands or divisions stationed at the installation.

Sign Type E2 - Standard Motivation Sign is used to support campaigns and special events.

Sign Type E3 - Unit Motivation Sign is used to express unit pride and display organizational insignias, emblems, and mottos.

11.4.3.3 Guide Signs

These signs are the essential means for locating destinations and routing travel to those destinations within a military installation. This includes site directory map signs at all entrance gates and other key points with the installation, large street name signs at all intersections, and large-lettered destination signs of not more than three lines. These signs provide the most efficient means of guiding traffic to destinations within the installation.

11.4.4.4 Mandatory/Prohibitory Signs

This category of signage is intended to maintain security and safety on the installation perimeter and at other specific secure areas. These signs notify visitors of restrictions, as well as other security procedures. The guidelines for design, fabrication, and placement of warning signs are found in [Technical Manual \(TM\) 5-807-10, Signage](#), paragraph 3-9.

There are several types of installation warning signs as follows:

Sign Type G1 - Warning Sign is intended as a search and authorized personnel warning sign.

Sign Type G2 - Warning Sign is intended as a restricted area warning sign.

Sign Type G3 - Warning Sign, identifies general hazards, regulations and security information as Type G2, but is smaller in size.

Sign Type G4 - Safety Sign identifies specific dangers and warns personnel and visitors of physical hazards and unsafe practices.

Sign Type G5 and G6 - Parking Sign.

Handicapped parking signs should show the international handicapped symbol in white on the required blue background. Strictly limit reserved parking signs to visitors, customers, handicapped, key officials, and incentive award winners (NCO of the Quarter). Use metal signs approximately 4" high and mechanically fastened to the vertical curb face. Design and color should match the installation-wide system.

Sign Type G7 - Special Traffic Conditions Sign, such as tactical equipment limits and trail crossings, follow guidelines established in [MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings](#) and standards in the [Manual of Uniform Traffic Control Devices \(MUTCD\)](#).

11.4.3.5 Information Signs

These are used to provide educational information and directional guidance for visitors. These signs is used to give priority to the destinations of facilities that are likely to have a great deal of first time traffic include the Commissary, Post Exchange, Clinic, Community Center, clubs, billeting, and major Army activities.

These signs are designed to include the following:

Typeface: Lettering is self-adhesive backing material.

- Helvetica Medium, upper and lower case

Arrow:

- Place at the end indicating direction (Fig 11.25)
- Stroke width: Helvetica Medium cap

Color:



Fig. 11.25 – Guidance Signs Locate at Major Decision Points

- Panel: Dark Brown (Pantone 18-1027 TPX. See Supplemental Page L-4a)
- Lettering: White
- Post: Black
- Exposed panel backs and edges: Dark Brown
- All paint: Semi gloss

Materials:

- Panel: Double-face, 1/8" thick aluminum
- Post: Black steel signposts are encouraged. Black vinyl sleeves for signpost and dark brown adhesive vinyl sheeting for the backs of signs provide a low-maintenance option.
- Foundation: Concrete pier or direct burial

There are two types of information signs:

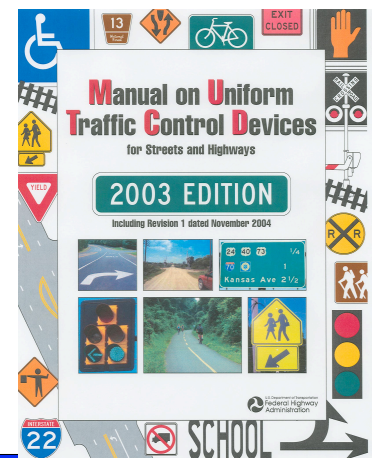
Sign Type H1 - Exhibit Information Sign.

Sign Type H2 - Guidance Sign provides direction guidance motorist or pedestrian in, around, and out of the installation. The legibility and placement of this sign, as well as the order of information, is critical to their effectiveness. These signs should be placed in central locations and at major decision points along circulation routes.

Messages will be grouped in the following order according to their arrow direction: forward, left, and right. In addition, placement of the message on the sign panel is determined by the arrow direction. Destinations forward and left are listed first and have flush left messages. Destinations right are listed next and have flush right messages. The arrow is centered in the space between the message and the edge of the sign. Prioritize destinations to be listed by giving the highest priority to the destinations that are most often sought by people new to the garrison or that serve as highly visible landmarks on the garrison. Those who live or work on the garrison or who visit frequently do not need the degree of help required by a first time or infrequent visitor. These signs are designed to include the following:

11.4.3.6 Regulatory Signs

These signs provide the rules for travel and parking on the installation. They include highway signs, warning signs, parking



control signs, etc. Related to these signs are pavement markings and traffic signals. [Manual of Uniform Traffic Control Devices \(MUTCD\)](#) (Fig. 11.26) standardizes regulatory devices throughout the country to ensure that they mean the same to, and require the same action by, all motorists (Fig. 11.27). Therefore, compliance with the MUTCD will contribute to the safe, orderly, and efficient movement of traffic. Also see [MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings](#).

These signs are designed to include the following:

Typeface: Lettering is self-adhesive backing material.

- Helvetica Medium, upper and lower case

Color:

- Panel: Sign color, size and shape prescribed by the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)
- Post: Black
- Exposed panel backs and edges: Dark Brown

Material:

- Panel: Double-face, 1/8" thick aluminum
- Post: Steel breakaway pipe
- Foundation: Concrete pier or direct burial

11.4.4 Street Addresses

The addressing procedures prescribed in [Department of Defense Manual \(DODM\) 4525.8-M, DoD Official Mail Manual](#) are mandatory for use by all DoD components. DoD 4525.8-M, Chapter 3 prescribes the following:

All DoD addresses shall be assigned so they are compatible with the United States Postal Services automated delivery point sequencing (C3.3).

- The DoD installation is responsible for assigning city-style, street address on the installation (C3.3.2.2).
- Street addresses shall be assigned and used even though a DoD activity may deliver the mail to the addressee (C3.3.2.2.1).



Fig. 11.27 – MUTCD Regulatory Signs

- Only geographically locatable civilian-style street address (such as 4102 Cindy Avenue) shall be used (C3.3.2.2.4).
- Installations shall not use one street address for the entire installation and then use secondary unit designators such as "Building 123" to designate the delivery addresses on the installation (C3.3.2.2.5).
- Addresses such as "Building 123 Roberts Street" are not a valid address format and shall not be used (C3.3.2.2.6).

11.4.5 Address Placement Standards

- Place addresses by the front entrance of the building so they can be seen (C3.3.2.3.1).
- Place both the street name and address number on the building if both the building number and street address are visible from the street.
- Building identification signs will use street addresses.
- Buildings without identification signs shall have the address number and street name centered above the main entrance or located to the right side.

11.4.6 Circuit Running Trail Sign Standards

- Sign panel shall be fabricated of 1/8" thick aluminum or approved equal. All exposed surfaces of the sign panel including the reverse side and edges shall have a field or factory applied paint or enamel finish over primer.
- Signs shall be secured to posts with two 0.25 inch carriage bolts cut flush with the nut. Head of bolt shall be painted to match face of sign. Non-compatible metals shall be isolated by coating or gasket material so as to prevent galvanic action.
- Post shall be 3 x 3 wood or 3 inch diameter pipe or 3 inch tube. Post shall be treated to resist structural degeneration or corrosion. Finish on post may be either natural or white paint or factory applied white low sheen enamel.
- Post shall be set so that at least 60 centimeters (24 inches) of length is set firmly in earth. Type font shall be Helvetica Medium, 10 centimeters (4 inches) high, painted in white enamel on a colored panel.
- Unless otherwise directed, sign shall give distance in miles or quarter fractions thereof.

- Sign shall contain two lines of type. The upper line shall read "MILE". The lower line shall consist of a numeral/s indicating unit distance. Center each line on the sign panel.
Example: MILE MILE
 3/4 3
- See Fig. 11.28 and Paragraph. [9.12.5 Recreational Running Trails](#) for additional guidance.

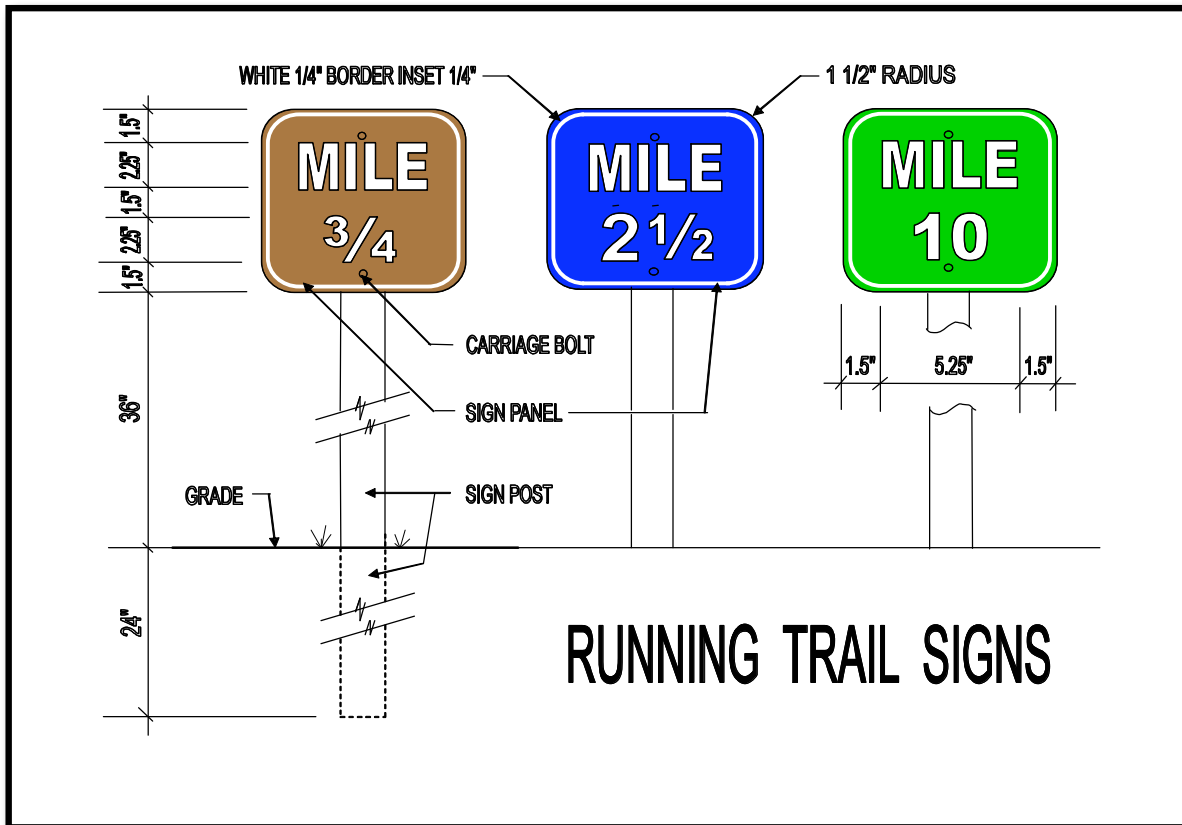


Fig. 11.28 - Signage for Circuit Running Trails Detail

11.4.7 Electronic Exterior Signs

All exterior flashing signs, traveling lights, or signs animated by lights of changing degrees of intensity or color are prohibited.

11.4.8 Housing Area Sign Standards

Street and address identification signs within housing areas should be complimentary to the architectural setting of the housing area and approved by the installation Real Property Planning Board. Housing numbers should be placed on the curb in front of the respective house and on the house where lighting will effectively light the numbering.

11.4.9 Street Sign Standards

Street name identification signs should be designed with the same lettering, color, and materials as other information signs (Fig. 11.29).

11.4.10 Wheeled Electrical Signs

Wheeled electrical signs will have an attractive presentation. Temporary landscape elements should be used whenever possible. The siting of this type of sign will be approved by the RPPB. No sign of this type will be left in place for longer than six (6) months. After which time, the sign will be removed or turned into a permanent sign.

11.4.11 Sign Placement

Placement of signs differs according to the type of sign and the specific site constraints. The following guidelines apply to placement of the majority of signs.

- Do not place more than one sign at any location. Traffic rules are the exception to this rule.
- Place signs in areas free of visual clutter and landscape materials.
- Place signs in locations that allow enough time for the user to read and react to the message.
- Signs should not be placed to block sight lines at intersections.
- Place signs approximately 1.2 meters (4 feet) above ground level to be within 10 degrees the driver's line of vision (Fig 11-30). Provide proper placement to avoid a hazard to children.

11.4.12 Sign System Typography

11.4.12.1 Military Emblems

The Army has a rich tradition of military heraldry. Military emblems are an important part of the soldiers' identity and the emblems have been carefully crafted over the years to express unit pride and unique history and function of the unit. The care and use of organizational emblems in a signage system can add visual interest as well as build pride and a sense of history. However, the overuse of miscellaneous emblems can lead to clutter and a

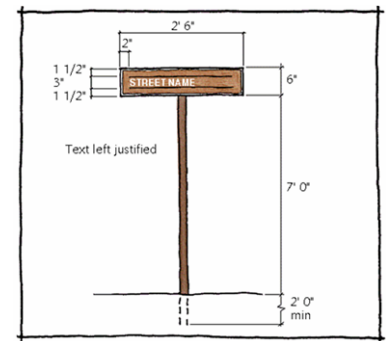
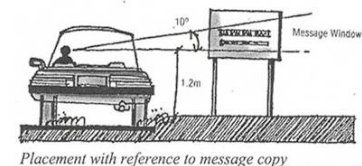
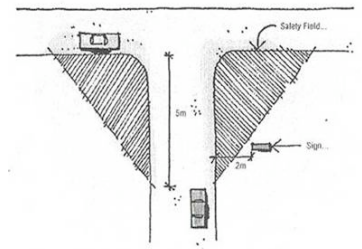


Fig. 11.29 - Typical Street Signs



Placement with reference to message copy



Placement with reference to signing

Fig. 11.30 - Placement Is Critical To Ensure Easy Readability

dilution of their importance. Colors for military emblems must be in accordance with the Institute of Heraldry.

11.4.12.2 Department of the Army Plaque

The plaque should be displayed on installation identification signage to emphasize the heritage and professionalism of the United States Army. The design of the plaque must be in accordance with [Army Regulation \(AR\) 840-1, Department of the Army Seal, and Department of the Army Emblem and Branch of Service Plaques](#), and must be reproduced in full color.

11.4.12.3 Insignias

The use of branch insignia, shoulder sleeve insignia, coat of arms, and/or distinctive insignia on headquarters signs is permitted. All military emblems must appear in full color. Motivational symbols or motifs will not be used.

11.4.13 Reduce Visual Clutter

Over-signing detracts from a uniform sign system and if left uncontrolled will eventually destroy the integrity of the system. (Fig. 11.31)

Clutter creates confusion and ineffectiveness. Often motorists and pedestrians are confused by the bombardment of messages that have no relationship to each other, or the communication is on such a minimal level that the sign serves no purpose.

11.4.14 Location Maps

The location map is an integral element of an installation entrance. The location map display provides information and sense of place to the viewer. The design and construction should be of compatible architectural materials found throughout the installation (Fig. 11.32).

The location map will contain the following characteristics within the design.

- Plexiglas secured over map for protection against graffiti and the elements
- Architecturally compatible materials used for the base
- Paved walk-up area
- Litter receptacle

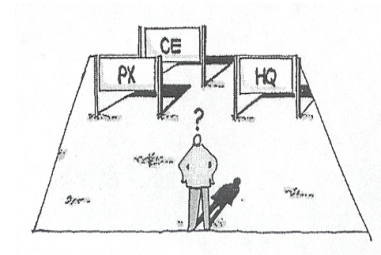


Fig. 11.31 - Visual Clutter Causes Confusion

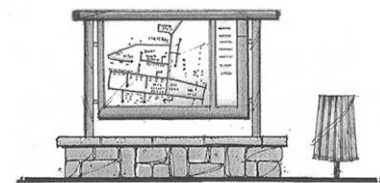


Fig. 11.32 - Location Maps Provide a Sense of Place

- Provide parking adjacent
- Provide current takeaway maps

9.6 PAVEMENT MARKING STANDARDS

9.6.1 Pavement markings shall be as described in Part 3 of the [Manual of Uniform Traffic Control Devices \(MUTCD\)](#), also see Chapter 6, Site Elements, paragraph 6.4.4.3.4, for traffic related signage.

9.6.2 Concrete curbs and gutters shall not be painted. Markings shall be restricted to the pavement surface and marking paint shall not be applied to concrete curb, gutter, or any portion thereof including curb cuts for vehicle or wheelchair access.

9.6.3 Markings intended to prohibit parking shall be applied to the pavement surface parallel to the curb and gutter in a continuous band for the entirety of the restricted length of pavement.

9.6.4 Where appropriate a boxed area shall be created with diagonal lines to establish a no parking zone in street conditions such as curb side parking, etc.

APPENDIX O

PLANT

PALETTE

O.1 The visual image conveyed by a military installation is created by the architectural character site organization, and the landscape design. Section 10, *Landscape Design Standards* describes the required selection, placement, and maintenance of plant material at Fort Leonard Wood. Planted material includes trees, shrubs, bedding plants and ground covers such as grass for lawns. These plants collectively provide a simple and cost effective enhancement to the general appearance of the installation. Moreover plantings add an element of human scale to open spaces and can be used functionally to screen undesirable views, buffer winds, reinforce the hierarchy of the circulation system, or provide a visual transition between dissimilar land uses and enhance Force Protection measures. (See Fig. O.1 and Fig. O.2)

O.2 Plant selection and placement must be carefully considered for reasons of sustainability as discussed in Section 10 *Landscape Design Standards*.

O.3 A plant palette has been created to simplify this process of plant selection and placement. The plant selection list, which follow, have been created corresponding to each of the Visual Zones established in Section 5, *Visual Themes and Zones*. The Visual Zone Map and Table are included in this Appendix as Fig. O.3 and Table O-1.

Note: Print single sided only. Pages O-3 through O-93 will automatically print in landscape.



Fig. O.1 – Landscaping improves the overall visual quality of the installation



Fig. O.2 – Trees provide shade and visual interest including seasonal color.

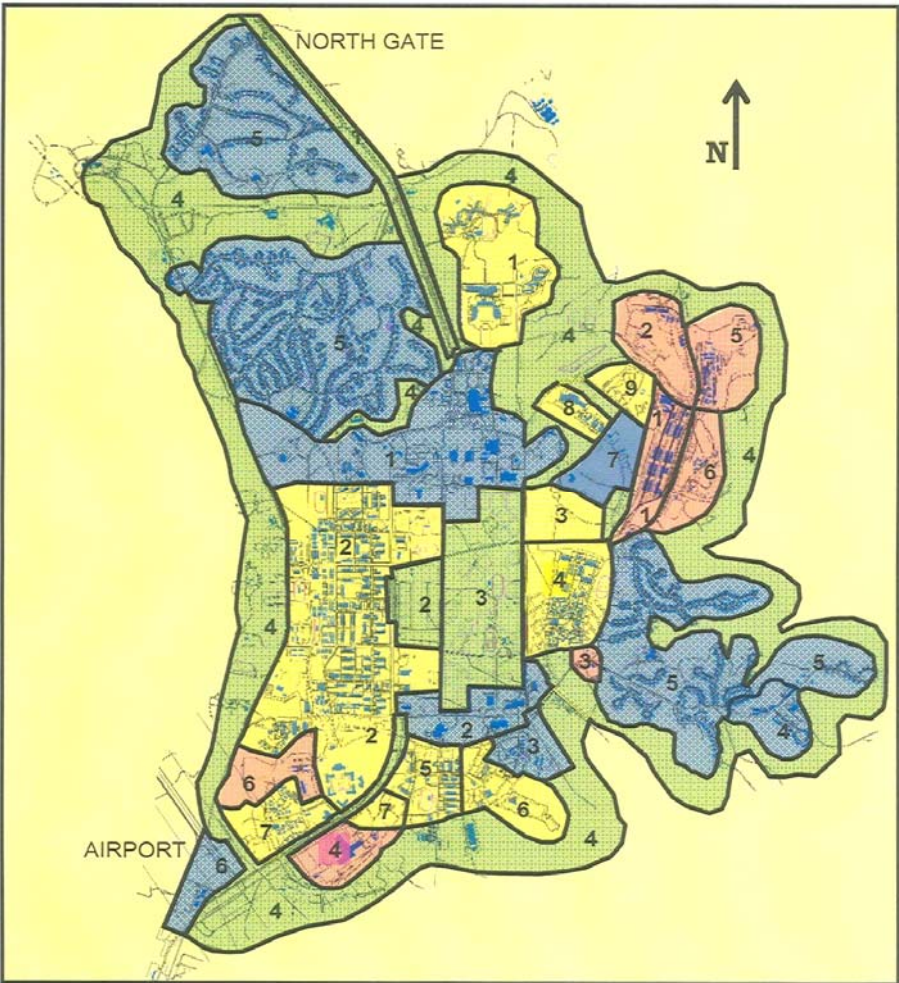


FIG. O-3 FORT LEONARD WOOD VISUAL ZONES MAP

TABLE O-1 VISUAL THEME AND ZONE RELATIONSHIP CHART			
OPEN AREA THEME	COMMUNITY LIFE THEME	MISSION THEME	INDUSTRIAL THEME
Visual Zones	Visual Zones	Visual Zones	Visual Zones
1-Missouri Ave. Entry Corridor 2-Gammon Field 3-Outdoor Recreation 4-Natural Environment	1-Town Center 2-Community Activities Area 3- Preservation Area 4- Sturgis Heights 5-Family Housing 6-Airport Facilities 7-Tech Park	1-Maneuver Center 2-Initial Entry Training 3-Permanent Party Barracks 4-Specker Barracks 5-MP Troop Complex 6-US Army Reserve 7-Army Nat'l Guard 8-Battalion Reception 9- Special Training	1-Supply Facilities 2- Logistics 3-Water Treatment 4-TMP 5-Public Works 6-Vehicle Maintenance

PLANT SELECTION LIST												
Plant Material Suitability Matrix												
MISSOURI AVENUE ENTRY CORRIDOR												
* Indicates poisonous **Indicates thorned												
Botanical Name		Common Name		Notes								
LARGE TREES												
Acer saccharum		Sugar Maple	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'Legacy'
Betula nigra		River Birch	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'Heritage', Soil pH 6.5 or less
Celtis laevigata		Sugar Hackberry	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'All Seasons' or 'Magnifica'
Fraxinus americana		White Ash	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'Autumn Applause' or 'Autumn Purple'
Fraxinus pennsylvanica		Green Ash	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'Summit' or 'Marshall Seedless'
Ginkgo biloba *		Ginkgo (male)	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
Liquidambar styraciflua		American Sweetgum	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
Liriodendron tulipifera		Tuliptree	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
Quercus palustris *		Pin Oak	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Develops iron chlorosis in high pH soils
Quercus phellos *		Willow Oak	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Develops iron chlorosis in high pH soils
Quercus rubra *		Northern Red Oak	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Develops iron chlorosis in high pH soils
Pinus ponderosa *		Ponderosa Pine	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
Pinus strobus		White Pine	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
Taxodium distichum		Bald Cypress	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
MEDIUM TREES												

**MISSOURI AVENUE
ENTRY CORRIDOR**

2010

[illegible]

生

***GAMMON FIELD and
OUTDOOR
RECREATION***

2010 Fort Leonard Wood IDG Page O-8

[illegible]

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PLANT SELECTION LIST		Plant Material Suitability Matrix																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Botanical Name		Common Name	Plant Characteristics										Plant Culture			Landscape Use		Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
			Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer		Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Acer platanoides		Norway Maple	▽											▽						▽	▽	▽	▽	▽	▽	▽	▽	▽																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

[illegible]

June 25, 2010

PLANT SELECTION LIST

Plant Material Suitability Matrix

***TOWN CENTER and
COMMUNITY
ACTIVITIES AREA***

* Indicates poisonous
** Indicates thorned

* Indicates poisonous

****Indicates thorned**

[illegible]

PLANT SELECTION LIST									
Plant Material Suitability Matrix									
<div>TOWN CENTER and COMMUNITY ACTIVITIES AREA</div> <div>* Indicates poisonous **Indicates thorned</div>									
Botanical Name		Common Name		Notes					
Koeleruteria paniculata		Goldenrain Tree							
Picea abies		Norway Spruce							
Pyrus calleryana ‘Bradford’		Bradford Pear							Also ‘Capital’, ‘Redspire’, or ‘Artisocrat’; susceptible to wind damage
Quercus acutissima*		Sawtooth Oak							Develops iron chlorosis in high pH soils
Tilia Americana		Basswood							Specify ‘Rosehill’, ‘Douglas’ or ‘Redmond’
Tilia cordata		Littleleaf Linden							Specify ‘June Bride’ or ‘Greenspire’
SMALL TREES									
Cercis Canadensis		Redbud							‘Forest Pansy’ is a purpleleaf form
Cornus florida		Flowering Dogwood							Specify ‘Cherokee Princess’ or ‘Rubra’
Cornus kousa		Kousa Dogwood							Specify var. chinensis or ‘Milky Way’
Crataegus crus-galli Thunbergii		Thornless Cockspur Hawthorn							
Malus x ‘Bob White’		Bob White Crabapple							
Malus x ‘Mary Potter’		Mary Potter Crabapple							
Malus x ‘Prairiefire’		Prairiefire Crabapple							
Malus x ‘Red Jewel’		Red Jewel Crabapple							
Malus x ‘Donald Wyman’		Donald Wyman							

PLANT SELECTION LIST		Plant Type	Shape				Growth Rate	Flower-ing			Special Interest	Soil Conditions			Expos-ure	Toler-ance			Functional Uses	Notes																		
Plant Material Suitability Matrix		Deciduous	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist		Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier	
TOWN CENTER and COMMUNITY ACTIVITIES AREA * Indicates poisonous **Indicates thorned		Common Name		Plant Characteristics																	Plant Culture						Landscape Use											
		Crabapple																																				
		Malus x ‘Sugar Tyme’		▽			▽						▽					▽			▽								▽					▽				
		LARGE SHRUBS																																				
		Euonymous alatus ‘Compactus’*		▽					▽										▽			▽					▽					▽					Favorite for deer	
		Taxus x media ‘Hicksii’																				▽					▽										Specify ‘Asian Beauty’ or ‘Eric’	
		Viburnum dilatatum		▽					▽										▽			▽					▽										Specify ‘Lanarth’, ‘Mariesii’ or ‘Cascade’	
		Viburnum plicatum var. toment		▽			▽												▽			▽					▽											
		Viburnum x rhytid. ‘Willowwood’		▽						▽												▽					▽											
		MEDIUM SHRUBS																																				
Azalea yedoense poukhanense*		▽			▽								▽					▽			▽					▽										Needs protected site		
Berberis mentorensis		▽			▽					▽								▽			▽				▽											Good hedge plant		
Berberis thunbergii atropurpurea**		▽			▽												▽			▽					▽											Specify ‘Crimson Pygmy’ or ‘Rose Glow’		
Cotoneaster divaricata		▽															▽			▽					▽												Avoid high pH soils	
Cotoneaster glabra ‘Compacta’*			▽		▽								▽				▽								▽												Tolerates calcareous soils	
Junus mugo var. mugo			▽																▽						▽												Avoid heavy clay soils and wet sites	
Quercus x media densiformis*			▽																	▽					▽													
SMALL SHRUBS																																						

PLANT SELECTION LIST

Plant Material Suitability Matrix

***TOWN CENTER and
COMMUNITY
ACTIVITIES AREA***

* Indicates poisonous
** Indicates thorned

PLANT SELECTION LIST																																				
Plant Material Suitability Matrix																																				
TOWN CENTER and COMMUNITY ACTIVITIES AREA																																				
			* Indicates poisonous **Indicates thorned																																	
Botanical Name	Common Name	Plant Characteristics										Plant Culture					Landscape Use					Notes														
Plant Type	Shape	Growth Rate	Flowering	Special Interest	Soil Conditions	Exposure	Tolerance	Functional Uses																												
Deciduous	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier		
Cotoneaster apiculata						▽				▽	▽				▽	▽		▽	▽	▽	▽	▽	▽	▽		▽							▽			
Juniperus horizontalis spp.						▽				▽				▽				▽	▽	▽	▽	▽	▽			▽						▽				
Juniperus chinensis procumbens						▽				▽				▽				▽	▽	▽	▽	▽	▽			▽						▽				Specify 'Nana' or 'Greenmound'
Spirea x bumalda									▽			▽						▽	▽	▽	▽	▽	▽									▽				Also 'Goldflame'
Spirea japonica						△				△								△	△	△	△	△	△									▽				Specify 'Little Princess' or 'Goldmound'
GROUND COVERS																																				
Euonymus fortunei 'Coloratus'*														▽				▽	▽	▽	▽	▽	▽	▽								▽				
Hedera helix x 'Baltic'*																	▽	▽	▽	▽	▽	▽	▽									▽				Also 'Bulgaria'
Liriope muscari																		▽	▽	▽	▽	▽	▽									▽				
Vinca minor																		△	△	△	△	△	△										▽			
GRASSES																																				
Festuca elatior 'Jaguar'*																		▽																▽		
Festuca rubrum 'Pennlawn'																		▽																▽		
Solius perenne																		▽																▽		
Eoe pratensis																		▽																▽		
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Page 525 of 741

PLANT SELECTION LIST									
Plant Material Suitability Matrix									
<div>PRESERVATION AREA<div>* Indicates poisonous **Indicates thorned</div></div>									
Botanical Name		Common Name		Notes					
Koeleruteria paniculata		Goldenrain Tree							
Picea abies		Norway Spruce							
Pyrus calleryana 'Bradford'		Bradford Pear							Also 'Capital', 'Redspire', or 'Artistocrat'; susceptible to wind damage
Quercus acutissima*		Sawtooth Oak							Develops iron chlorosis in high pH soils
Tilia Americana		Basswood							Specify 'Rosehill', 'Douglas' or 'Redmond'
Tilia cordata		Littleleaf Linden							Specify 'June Bride' or 'Greenspire'
SMALL TREES									
Cercis Canadensis		Redbud							'Forest Pansy' is a purpleleaf form
Cornus florida		Flowering Dogwood							Specify 'Cherokee Princess' or 'Rubra'
Cornus kousa		Kousa Dogwood							Specify var. chinensis or 'Milky Way'
Crataegus crus-galli Thunbergii		Thornless Cockspur Hawthorn							
Malus x 'Bob White'		Bob White Crabapple							
Malus x 'Mary Potter'		Mary Potter Crabapple							
Malus x 'Prairiefire'		Prairiefire Crabapple							
Malus x 'Red Jewel'		Red Jewel Crabapple							
Malus x 'Donald'		Donald Wyman							

PLANT SELECTION LIST		Plant Type	Shape					Growth Rate			Flower-ing			Special Interest	Soil Conditions				Expos-ure	Toler-ance	Functional Uses					Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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PLANT SELECTION LIST		Plant Type	Shape				Growth Rate		Flower-ing		Special Interest	Soil Conditions				Expos-ure	Toler-ance	Functional Uses					Notes																
Plant Material Suitability Matrix			Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic		Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier		
PRESERVATION AREA		Common Name																						Plant Culture					Plant Characteristics					Landscape Use					
* Indicates poisonous		Botanical Name																																					
**Indicates thorned		SMALL SHRUBS																																					
	Cotoneaster apiculata		Cranberry Cotoneaster	▽							▽					▽		▽	▽	▽	▽	▽	▽	▽	▽														
	Juniperus horizontalis spp.	▽	Horizontal Juniper								▽					▽			▽	▽	▽	▽	▽	▽	▽														
	Juniperus chinensis procumbens		Procumbens Juniper													▽			▽	▽	▽	▽	▽	▽	▽														
	Spirea x bumalda	▽	Anthony Waterer Spirea													▽			▽	▽	▽	▽	▽	▽	▽														
	Spirea japonica	△	Japanese Spirea													△			△	△	△	△	△	△	△														
GROUND COVERS																																							
	Euonymus fortunei 'Coloratus'*	▽	Purpleleaf Wintercreeper							▽						▽			▽	▽	▽	▽	▽	▽	▽														
	Hedera helix x 'Baltic'*	▽	Baltic Ivy							▽									▽	▽	▽	▽	▽	▽	▽														
	Liriope muscari	△	Big Blue Liriope													△			△	△	△	△	△	△	△														
	Vinca minor	▽	Vinca minor													▽			▽	▽	▽	▽	▽	▽	▽														
GRASSES																																							
	Festuca elatior 'Jaguar'*	▽	Jaguar Turf-type Tall Fescue								▽								▽																				
	Festuca rubrum 'Pennlawn'	▽	Pennlawn Red Fescue													▽			▽																				
	Lolius perenne	▽	Perennial Rye Grass													▽																							
	Poa pratensis	△	Kentucky Bluegrass													△																							

PRESERVATION
AREA

* Indicates poisonous **Indicates thorned

2010

[illegible]

PLANT SELECTION LIST			Plant Type	Shape								Growth Rate			Flower-ing			Special Interest	Soil Conditions	Expos-ure	Toler-ance	Functional Uses	Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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Botanical Name	Common Name	Plant Characteristics													
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Deciduous	Conical	Fast	Spring	Foliage	Moist	Sun	Pest Resistant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier	
Evergreen	Columnar	Irregular	Summer	Fruit	Average	Part Shade	Drought Resistant								
Native	Round/Oval	Moderate	Fall		Dry	Full Shade	Pollution Tolerant								
	Weeping				Acidic										
	Upright				Alkaline										
	Spreading														

PLANT SELECTION LIST		Plant Type	Shape				Growth Rate			Flower-ing	Special Interest	Soil Conditions				Expos-ure	Toler-ance	Functional Uses					Notes																						
Plant Material Suitability Matrix			Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier						
Botanical Name		Common Name	Plant Characteristics																																										
LARGE TREES																																													
	Acer saccharum	Sugar Maple	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Legacy'	
	Celtis laevigata	Sugar Hackberry	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'All Seasons' or 'Magnifica'	
	Fraxinus pennsylvanica	Green Ash	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Summit' or 'Marshall Seedless'	
	Liquidambar s. 'Rotundiloba'	Fruitless Sweetgum	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils		
	Quercus palustris *	Pin Oak	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils		
	Quercus phellos *	Willow Oak	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils		
	Quercus rubra *	Northern Red Oak	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils		
	Picea glauca	White Spruce	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils		
	Pinus ponderosa *	Ponderosa Pine	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils		
	Pinus strobus	White Pine	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils		
	Taxodium distichum	Bald Cypress	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils		
MEDIUM TREES																																													
	Acer rubrum *	Red Maple	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Red Sunset', 'October Glory', or 'Armstrong'
	Gleditsia triacanthos 'Serpens' *	Thornless Honeylocust	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Moraine' or 'Shademaster'	

Friday, June 25, 2010

PLANT SELECTION LIST																																					
Plant Material Suitability Matrix																																					
TECH PARK	Plant Type		Shape				Growth Rate		Flower-ing		Special Interest		Soil Conditions			Expos-ure			Toler-ance		Functional Uses																
	Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier
	* Indicates poisonous **Indicates thorned																																				
	Botanical Name		Common Name		Plant Characteristics										Plant Culture										Landscape Use						Notes						
	LARGE TREES																																				
	Acer saccharum		Sugar Maple		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Legacy'
	Celtis laevigata		Sugar Hackberry		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'All Seasons' or 'Magnifica'
	Fraxinus pennsylvanica		Green Ash		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Summit' or 'Marshall Seedless'	
	Liquidambar s. 'Rotundiloba'		Fruitless Sweetgum		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils	
	Quercus palustris *		Pin Oak		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils	
Quercus phellos *		Willow Oak		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils		
Quercus rubra *		Northern Red Oak		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils		
Picea glauca		White Spruce		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils	
Pinus ponderosa *		Ponderosa Pine		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils	
Pinus strobus		White Pine		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils	
Taxodium distichum		Bald Cypress		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils	
MEDIUM TREES																																					
Juniperus communis *		Red Maple		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Red Sunset', 'October Glory', or 'Armstrong'	
Quercus laevis *		Thomless Honeylocust		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Moraine' or 'Shademaster'	

PLANT SELECTION LIST		Plant Type	Shape				Growth Rate			Flower-ing			Special Interest	Soil Conditions				Expos-ure			Toler-ance	Functional Uses						Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Botanical Name	Common Name		Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun		Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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PLANT SELECTION LIST

Plant Material Suitability Matrix

TECH PARK

* Indicates poisonous
** Indicates thorned

PLANT SELECTION LIST													
Plant Material Suitability Matrix													
TECH PARK													
* Indicates poisonous ** Indicates thorned													
Botanical Name		Common Name		Notes									
SMALL SHRUBS													
Cotoneaster apiculata		Cranberry Cotoneaster											
Juniperus horizontalis spp.	▽	Horizontal Juniper								▽			
Juniperus chinensis procumbens		Procumbens Juniper								▽		Specify 'Nana' or 'Greenmound'	
Spiraea x bumalda	▽	Anthony Waterer Spiraea							▽	▽		Also 'Goldflame'	
Spiraea japonica	▽	Japanese Spiraea							▽	▽		Specify 'Little Princess' or 'Goldmound'	
GROUND COVERS													
Euonymus fortunei 'Coloratus' *	▽												
Hedera helix x 'Baltic' *	▽	Baltic Ivy								▽	▽	Also 'Bulgaria'	
Liriope muscari	▽	Big Blue Liriope								▽	▽		
Vinca minor	▽	Vinca minor								▽	▽		
GRASSES													
Festuca elatior 'Jaguar' *	▽	Jaguar Turf-type Tall Fescue											
Festuca rubrum 'Pennlawn'	▽	Pennlawn Red Fescue											
Lolium perenne	▽	Perennial Rye Grass											
Poa pratensis	▽	Kentucky Bluegrass											

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PLANT SELECTION LIST		Plant Type	Shape				Growth Rate			Flower-ing			Special Interest	Soil Conditions				Expos-ure	Toler-ance	Functional Uses																					
Plant Material Suitability Matrix		Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier			
Botanical Name	Common Name	Plant Characteristics																													Plant Culture				Landscape Use					Notes	
																																							Glory', or 'Armstrong'		
Gleditsia triacanthos 'inermis' *	Thornless Honeylocust	▽		▽						▽									▽		▽					▽							▽						Specify 'Moraine' or 'Shademaster'		
Koeleruteria paniculata	Goldenrain Tree	▽				▽							▽					▽				▽										▽									
Picea abies	Norway Spruce		▽										▽									▽					▽														
Pyrus calleryana 'Bradford'	Bradford Pear	▽				▽							▽						▽			▽																	Also 'Capital', 'Redspire', or 'Aristocrat', Susceptible to wind damage		
Tilia americana	Basswood	▽	▽				▽						▽													▽													Specify 'Rosehill', 'Douglas' or 'Redmond'		
Tilia cordata	Littleleaf Linden	▽				▽							▽									▽					▽													Specify 'June Bride' or 'Greenspire'	
SMALL TREES																																									
Cercis canadensis	Redbud	▽	▽							▽			▽						▽				▽			▽														'Forest Pansy' purple leaf form	
Cornus florida	Flowering Dogwood	▽	▽							▽				▽				▽				▽																	Specify 'Cherokee Princess' or 'Rubra'		
Cornus kousa	Kousa Dogwood	▽													▽				▽			▽																	Specify var. 'chinensis' or 'Milky Way'		
Crataegus crus-galli inermis	Thornless Cockspur Hawth.	▽	▽			▽									▽				▽			▽																	Red berries		
Crataegus phaenopyrum**	Washington Hawthorn	▽	▽				▽												▽			▽																	Red berries, Thorns		
Crataegus viridis 'Winter King**'	Winter King Hawthorn	▽	▽				▽												▽			▽																	Red berries, Thorns		
Quercus alba 'Stuebelii'	American Holly		▽	▽																		▽																		Requires 1 male and 2 females for fruit. Not wind tolerant.	

PLANT SELECTION LIST

Plant Material Suitability Matrix

* Indicates poisonous
**Indicates thorned

Botanical Name	Common Name	Plant Characteristics										Plant Culture					Landscape Use					Notes
Berberis thunbergii atropurpurea**	Japanese Red Barberry	▽				▽				▽	▽	▽		▽	▽	▽	▽		Specify 'Crimson Pygmy' or 'Rose Glow'			
Buxus microphylla var. koreana*	Korean Boxwood		▽				▽					▽				▽		Needs sheltered site				
Cotoneaster divaricata	Spreading Cotoneaster	▽					▽			▽	▽	▽	▽	▽			▽					
Ilex glabra 'Compacta'*	Compact Inkberry Holly		▽	▽			▽		▽			▽	▽	▽	▽	▽	▽	Avoid high pH soils				
Pinus mugo var. mugo	Mugo Pine		▽				▽				▽		▽			▽	▽	Tolerates calcareous soils				
Taxus x media 'Densiformis' *	Densiformis Yew		▽				▽					▽		▽			▽					
SMALL SHRUBS																						
Cotoneaster apiculatus	Cranberry Cotoneaster	▽					▽				▽	▽	▽	▽	▽							
Juniperus horizontalis spp.	Horizontal Juniper		▽				▽			▽		▽	▽	▽			▽					
Juniperus procumbens	Japargarden Juniper		▽				▽				▽	▽	▽	▽	▽	▽	▽	Specify 'Nana' or 'Greenmound'				
Spiraea x bumalda	Anthony Waterer Spiraea	▽		▽				▽				▽	▽	▽	▽	▽	▽	Also 'Goldflame'				
Spiraea japonica	Japanese Spiraea	▽							▽				▽	▽	▽	▽	▽	'Little Princess', 'Shirobana', 'Gold Mound'				
GROUND COVERS																						
Anonymus fortunei 'Coloratus' *	Purpleleaf Wintercreeper		▽				▽				▽					▽	▽					
Federa helix x 'Baltic'*	Baltic Ivy		▽				▽					▽	▽	▽	▽	▽	▽	Also 'Bulgaria'				
Ninca minor	Common Periwinkle		▽					▽					▽	▽			▽					
GRASSES																						

PLANT SELECTION LIST Plant Material Suitability Matrix		Plant Type	Shape	Growth Rate	Flower- ing	Special Interest	Soil Conditions	Expos- ure	Toler- ance	Functional Uses	
MANEUVER SUPPORT CENTER * Indicates poisonous **Indicates thorned		Deciduous	Irregular	Fast	Spring	Foliage	Moist	Sun	Pest Resistant	Specimen	
		Evergreen	Upright	Moderate	Summer	Fruit	Dry	Part Shade	Drought Resistant	Screen/Windbreak	
			Spreading	Slow	Fall		Acidic	Full Shade		Parking Lot	
			Round/Oval				Average			Park/Lawn	
			Columnar								
			Conical							Street Tree	
										Massing	
										Barrier	
Botanical Name	Common Name	Plant Characteristics									
Festuca elatior 'Jaguar' *	Jaguar Turf-type Tall Fescue	▽	▽	▽			▽	▽			▽

INITIAL ENTRY TRAINING

* Indicates poisonous
** Indicates thorned

Botanical Name	Common Name	Plant Characteristics												Plant Culture						Landscape Use						Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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PLANT SELECTION LIST																																				
Plant Material Suitability Matrix																																				
Plant Type	Shape				Growth Rate	Flower- ing	Special Interest	Soil Conditions	Expos- ure	Toler- ance	Functional Uses																									
INITIAL ENTRY TRAINING	Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier
	* Indicates poisonous **Indicates thorned																																			
	Botanical Name	Common Name									Plant Characteristics										Plant Culture					Landscape Use					Notes					
	Euonymus fortunei 'Coloratus' *	Purpleleaf Wintercreeper									Δ							Δ		Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ				Δ	Δ	Δ			
	Hedera helix x 'Baltic'*	Baltic Ivy									Δ								Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ				Δ	Δ	Δ		Also 'Bulgaria'		
	Vinea minor	Common Periwinkle									Δ								Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ				Δ	Δ	Δ				
	GRASSES																																			
	Festuca elatior 'Jaguar' *	Jaguar Turf-type Tall Fescue									Δ									Δ					Δ								Δ			

PERMANENT PARTY BARRACKS

* Indicates poisonous
**Indicates thorned

Botanical Name	Common Name	Plant Characteristics												Plant Culture					Landscape Use				Notes
LARGE TREES		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Legacy'			
Acer saccharum	Sugar Maple	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'All Season' or 'Magnifica'			
Celtis laevigata	Sugar Hackberry	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Autumn Applause' or 'Autumn Purple'			
Fraxinus americana	White Ash	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Summit' or 'Marshall Seedless'			
Fraxinus pennsylvanica	Green Ash	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽				
Ginkgo biloba*	Ginkgo (male)	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽				
Liquidambar s. 'Rotundiloba'	Fruitless Sweetgum	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽				
Quercus palustris *	Pin Oak	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils			
Quercus phellos *	Willow Oak	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽				
Quercus rubra *	Northern Red Oak	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils			
Picea glauca	White Spruce	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽				
Pinus strobus	White Pine	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Develops iron chlorosis in high pH soils			
Taxodium distichum	Bald Cypress	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽				
MEDIUM TREES		▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Page 550 of 1017			
Acer platanoides	Norway Maple	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Columnare' or 'Summershade'			
Acer rubrum*	Red Maple	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify 'Red Sunset', 'October Glory'			

PLANT SELECTION LIST																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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		Thornless Honeylocust	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	

**Indicates thorned

PERMANENT PARTY
BARRACKS

* Indicates poisonous

SMALL TREES						
Magnolia x soulangiana	Saucer Magnolia	▽	▽	▽	▽	▽
Malus x 'Bob White'	Bob White Crabapple	▽	▽	▽	▽	▽
Malus x 'Mary Potter'	Mary Potter Crabapple	▽	▽	▽	▽	▽
Malus x 'Prairiefire'	Prairiefire Crabapple	▽	▽	▽	▽	▽
Malus x 'Red Jewel'	Red Jewel Crabapple	▽	▽	▽	▽	▽
Malus x 'Donald Wyman'	Donald Wyman Crabapple	▽	▽	▽	▽	▽
Malus x 'Sugar Tyme'	Sugar Tyme Crabapple	▽	▽	▽	▽	▽
LARGE SHRUBS						
Euonymus alatus 'Compactus' *	Dwarf Burning Bush	▽	▽	▽	▽	▽
Viburnum x dentatum	Arrowwood Viburnum	▽	▽	▽	▽	▽
Viburnum dilatatum	Linden Viburnum	▽	▽	▽	▽	▽
Viburnum plicatum var. toment.	Doublefile Viburnum	▽	▽	▽	▽	▽
Viburnum x rhytid.' Willowood'	Willowwood Viburnum	▽	▽	▽	▽	▽
MEDIUM SHRUBS						
Berberis mentorensis**	Mentor Barberry	▽	▽	▽	▽	▽
Berberis thunbergii atropurpurea**	Japanese Red Barberry	▽	▽	▽	▽	▽
Buxus microphylla var. koreana*	Korean Boxwood	▽	▽	▽	▽	▽
Cotoneaster divaricata	Spreading Cotoneaster	▽	▽	▽	▽	▽
Ilex glabra 'Compacta'*	Compact Inkberry Holly	▽	▽	▽	▽	▽
Pinus mugo var. mugo	Mugo Pine	▽	▽	▽	▽	▽
Taxus x media 'Densiformis' *	Densiformis Yew	▽	▽	▽	▽	▽
SMALL SHRUBS						
Cotoneaster apiculatus	Cranberry Cotoneaster	▽	▽	▽	▽	▽
Juniper horizontalis spp.	Horizontal Juniper	▽	▽	▽	▽	▽
Juniper procumbens	Japgarden Juniper	▽	▽	▽	▽	▽
Spiraea bumalda	Anthony Waterer Spirea	▽	▽	▽	▽	▽
Spiraea japonica	Japanese Spirea	▽	▽	▽	▽	▽
GROUND COVERS						

[illegible]

PLANT SELECTION LIST																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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* Indicates poisonous **Indicates thorned	SPECKER BARRACKS	Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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PLANT SELECTION LIST		Plant Material Suitability Matrix										Functional Uses										Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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SMALL TREES						
Magnolia x soulangiana	Saucer Magnolia	▽	▽	▽	▽	▽
Malus x 'Bob White'	Bob White Crabapple	▽	▽	▽	▽	▽
Malus x 'Mary Potter'	Mary Potter Crabapple	▽	▽	▽	▽	▽
Malus x 'Prairiefire'	Prairiefire Crabapple	▽	▽	▽	▽	▽
Malus x 'Red Jewel'	Red Jewel Crabapple	▽	▽	▽	▽	▽
Malus x 'Donald Wyman'	Donald Wyman Crabapple	▽	▽	▽	▽	▽
Malus x 'Sugar Tyme'	Sugar Tyme Crabapple	▽	▽	▽	▽	▽
LARGE SHRUBS						
Eunonymous alatus 'Compactus' *	Dwarf Burning Bush	▽	▽	▽	▽	▽
Viburnum x dentatum	Arrowwood Viburnum	▽	▽	▽	▽	▽
Viburnum dilatatum	Linden Viburnum	▽	▽	▽	▽	▽
Viburnum plicatum var. toment.	Doublefile Viburnum	▽	▽	▽	▽	▽
Viburnum x thytid.' Willowwood'	Willowwood Viburnum	▽	▽	▽	▽	▽
MEDIUM SHRUBS						
Berberis mentorensis**	Mentor Barberry	▽	▽	▽	▽	▽
Berberis thunbergii atropurpurea**	Japanese Red Barberry	▽	▽	▽	▽	▽
Buxus microphylla var. koreana*	Korean Boxwood	▽	▽	▽	▽	▽
Cotoneaster divaricata	Spreading Cotoneaster	▽	▽	▽	▽	▽
Ilex glabra 'Compacta'*	Compact Inkberry Holly	▽	▽	▽	▽	▽
Pinus mugo var. mugo	Mugo Pine	▽	▽	▽	▽	▽
Taxus x media 'Densiformis' *	Densiformis Yew	▽	▽	▽	▽	▽
SMALL SHRUBS						
Cotoneaster apiculatus	Cranberry Cotoneaster	▽	▽	▽	▽	▽
Juniperus horizontalis spp. horizontalis	Horizontal Juniper	▽	▽	▽	▽	▽
Juniperus procumbens	Japargden Juniper	▽	▽	▽	▽	▽
Juniper x bumalda	Anthony Waterer Spirea	▽	▽	▽	▽	▽
Spiraea japonica	Japanese Spirea	▽	▽	▽	▽	▽

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PLANT SELECTION LIST																																						
Plant Material Suitability Matrix																																						
Plant Type		Shape				Growth Rate		Flower-ing		Special Interest		Soil Conditions		Expos-ure		Toler-ance		Functional Uses				Notes																
MP TROOP COMPLEX	Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier	
Botanical Name		Common Name		Plant Characteristics										Plant Culture				Landscape Use				Notes																
LARGE TREES																																						
Acer saccharum		✓	✓			✓							✓						✓		✓					✓	✓					✓	✓				Specify 'Legacy'	
Celtis laevigata		✓	✓		✓							✓						✓	✓	✓		✓				✓	✓	✓				✓	✓				Specify 'All Season' or 'Magnifica'	
Fraxinus americana		✓	✓		✓							✓						✓	✓	✓						✓	✓	✓					✓	✓				Specify 'Autumn Applause' or 'Autumn Purple'
Fraxinus pennsylvanica		✓	✓							✓	✓							✓	✓	✓		✓				✓	✓	✓					✓	✓				Specify 'Summit' or 'Marshall Seedless'
Ginkgo biloba*		✓											✓				✓		✓		✓					✓	✓	✓					✓	✓				
Liquidambar s. 'Rotundiloba'		✓	✓			✓											✓		✓		✓													✓	✓			
Quercus palustris *		✓	✓	✓							✓								✓		✓				✓													Develops iron chlorosis in high pH soils
Quercus phellos *		✓	✓			✓						✓							✓		✓				✓	✓	✓	✓					✓	✓	✓			
Quercus rubra *		✓	✓		✓						✓								✓		✓				✓	✓	✓	✓					✓	✓	✓			Develops iron chlorosis in high pH soils
Picea glauca		✓	✓	✓													✓			✓					✓	✓	✓	✓					✓	✓	✓			
Pinus strobus		✓	✓	✓							✓									✓					✓	✓	✓	✓					✓	✓	✓			Develops iron chlorosis in high pH soils
Taxodium distichum		✓	✓	✓								✓								✓					✓	✓	✓	✓					✓	✓	✓			
MEDIUM TREES																																						
Acer platanoides		✓			✓							✓							✓																			Specify 'Columnare' or 'Summershade'
Acer rubrum*		✓	✓		✓							✓							✓																			Specify 'Red Sunset', 'October Glory'

PLANT SELECTION LIST		Plant Type	Shape					Growth Rate			Flower-ing			Special Interest	Soil Conditions				Expos-ure			Toler-ance	Functional Uses																		
Plant Material Suitability Matrix		Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier			
MP TROOP COMPLEX																																									
Botanical Name	Common Name		Plant Characteristics																			Plant Culture				Landscape Use					Notes										
Gleditsia triacanthos 'inermis' *	Thornless Honeylocust	Δ								Δ										Δ	Δ				Δ								Δ						Glory', or 'Armstrong'		
Koeleruteria paniculata	Goldenrain Tree	Δ											Δ						Δ	Δ				Δ								Δ							Specify 'Moraine' or 'Shademaster'		
Picea abies	Norway Spruce		Δ										Δ													Δ								Δ							
Pyrus calleryana 'Bradford'	Bradford Pear	Δ					Δ					Δ							Δ	Δ														Δ					Also 'Capital', 'Redspire', or 'Aristocrat', Susceptible to wind damage		
Tilia americana	Basswood	Δ					Δ						Δ													Δ									Δ					Specify 'Rosehill', 'Douglas' or 'Redmond'	
Tilia cordata	Littleleaf Linden	Δ					Δ						Δ													Δ								Δ	Δ	Δ	Δ	Δ		Specify 'June Bride' or 'Greenspire'	
SMALL TREES																																									
Cercis canadensis	Redbud	Δ	Δ							Δ			Δ		Δ				Δ						Δ		Δ								Δ					'Forest Pansy' purple leaf form	
Cornus florida	Flowering Dogwood	Δ		Δ						Δ				Δ	Δ			Δ		Δ									Δ											Specify 'Cherokee Princess' or 'Rubra'	
Cornus kousa	Kousa Dogwood	Δ												Δ	Δ				Δ					Δ						Δ										Specify var. 'chinensis' or 'Milky Way'	
Crataegus crus-galli inermis	Thornless Cockspur Hawth.	Δ					Δ							Δ	Δ			Δ		Δ																				Red berries	
Crataegus phaenopyrum**	Washington Hawthorn	Δ					Δ								Δ			Δ		Δ																				Red berries, Thorns	
Crataegus viridis 'Winter King**'	Winter King Hawthorn	Δ					Δ							Δ	Δ			Δ		Δ																				Red berries, Thorns	
Quercus sp.	American Holly		Δ	Δ							Δ			Δ	Δ			Δ		Δ																					Requires 1 male and 2 females for fruit. Not wind tolerant.

PLANT SELECTION LIST Plant Material Suitability Matrix														Functional Uses										Notes														
Botanical Name	Common Name	Plant Characteristics										Plant Culture					Landscape Use					Notes																
		Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier
MP TROOP COMPLEX														**Indicates thorned																								
Barberis thunbergii atropurpurea**	Japanese Red Barberry	▽					▽						▽					▽	▽	▽	▽	▽				▽				▽								Specify 'Crimson Pygmy' or 'Rose Glow'
Buxus microphylla var. koreana*	Korean Boxwood		▽				▽							▽							▽					▽												Needs sheltered site
Cotoneaster divaricata	Spreading Cotoneaster	▽					▽							▽				▽	▽	▽	▽	▽				▽											Avoid high pH soils	
Ilex glabra 'Compacta'	Compact Inkberry Holly	▽	▽				▽							▽				▽	▽	▽	▽	▽				▽											Tolerates calcareous soils	
Pinus mugo var. mugo	Mugo Pine		▽				▽							▽							▽					▽												
Taxus x media 'Densiformis' *	Densiformis Yew	▽	▽				▽							▽							▽					▽												
SMALL SHRUBS																																						
Cotoneaster apiculatus	Cranberry Cotoneaster	▽					▽							▽				▽	▽	▽	▽	▽				▽												
Juniperus horizontalis spp.	Horizontal Juniper	▽					▽							▽				▽			▽	▽				▽												
Juniperus procumbens	Japargarden Juniper	▽					▽							▽				▽			▽	▽				▽											Specify 'Nana' or 'Greenmound'	
Spirea x bumalda	Anthony Waterer Spirea	▽					▽							▽				▽		▽	▽	▽				▽											Also 'Goldflame'	
Spirea japonica	Japanese Spirea	▽					▽							▽						▽	▽	▽				▽											'Little Princess', 'Shirobana', 'Gold Mound'	
GROUND COVERS																																						
Euonymus fortunei 'Coloratus' *	Purpleleaf Wintercreeper		▽				▽							▽				▽	▽	▽	▽	▽				▽												
Federa helix x 'Baltic'*	Baltic Ivy		▽				▽							▽							▽	▽				▽												Also 'Bulgaria'
Ninca minor	Common Periwinkle		▽				▽							▽							▽	▽				▽												
GRASSES																																						

PLANT SELECTION LIST Plant Material Suitability Matrix		Plant Type	Shape	Growth Rate	Flower- ing	Special Interest	Soil Conditions	Expos- ure	Toler- ance	Functional Uses	
MP TROOP COMPLEX * Indicates poisonous **Indicates thorned		Deciduous	Conical	Fast	Spring	Foliage	Moist	Sun	Pest Resistant	Specimen	
		Evergreen	Round/Oval	Moderate	Summer	Fruit	Average	Part Shade	Drought Resistant	Street Tree	
		Native	Columnar	Slow	Fall	Fall Color	Dry	Full Shade	Pollution Tolerant	Screen/Windbreak	
			Weeping				Acidic			Massing	
			Upright							Park/Lawn	
			Spreading							Parking Lot	
			Irregular							Barrier	
Botanical Name	Common Name	Plant Characteristics									
Festuca elatior 'Jaguar' *	Jaguar Turf-type Tall Fescue	▽	▽	▽			▽	▽			▽

PLANT SELECTION LIST		Plant Type	Shape				Growth Rate			Flower-ing			Special Interest	Soil Conditions				Expos-ure		Toler-ance	Functional Uses						Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Botanical Name	Common Name		Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow		Spring	Summer	Fall	Foliage	Fruit	Fall Color		Moist	Average	Dry	Acidic	Alkaline	Sun		Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Friday, June 25, 2010

PLANT SELECTION LIST															
Plant Material Suitability Matrix															
ARMY NATIONAL GUARD															
* Indicates poisonous **Indicates thorned															
Botanical Name		Common Name		Plant Characteristics											
Plant Type		Shape				Growth Rate			Flower-ing			Special Interest		Soil Conditions	
Toler-ance		Expos-ure				Plant Culture			Landscape Use			Notes		Functional Uses	
Deciduous		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Evergreen		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Pollution Tolerant		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Drought Resistant		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Pest Resistant		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Full Shade		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Part Shade		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Sun		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Alkaline		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Acidic		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Dry		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Average		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Moist		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Fall Color		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Fruit		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Foliage		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Specimen		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Street Tree		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Massing		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Screen/Windbreak		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Parking Lot		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Park/Lawn		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Barrier		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Specify 'Legacy'		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Specify 'All Season' or 'Magnifica'		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Specify 'Autumn Applause' or 'Autumn Purple'		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Specify 'Summit' or 'Marshall Seedless'		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Develops iron chlorosis in high pH soils		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Develops iron chlorosis in high pH soils		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Develops iron chlorosis in high pH soils		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Specify 'Columnare' or 'Summershade'		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall
Specify 'Red Sunset', 'October 741		Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall

PLANT SELECTION LIST																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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		Deciduous		Evergreen		Native		Conical		Columnar		Round/Oval		Weeping		Upright		Spreading		Irregular		Fast		Moderate		Slow		Spring		Summer		Fall		Foliage		Fruit		Fall Color		Moist		Average		Dry		Acidic		Alkaline		Sun		Part Shade		Full Shade		Pest Resistant		Drought Resistant		Pollution Tolerant		Specimen		Street Tree		Massing		Screen/Windbreak		Parking Lot		Park/Lawn		Barrier																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

SMALL TREES							
Magnolia x soulangiana	Saucer Magnolia	▽	▽	▽	▽	▽	▽
Malus x ‘Bob White’	Bob White Crabapple	▽	▽	▽	▽	▽	▽
Malus x ‘Mary Potter’	Mary Potter Crabapple	▽	▽	▽	▽	▽	▽
Malus x ‘Prairiefire	Prairiefire Crabapple	▽	▽	▽	▽	▽	▽
Malus x ‘Red Jewel’	Red Jewel Crabapple	▽	▽	▽	▽	▽	▽
Malus x ‘Donald Wyman’	Donald Wyman Crabapple	▽	▽	▽	▽	▽	▽
Malus x ‘Sugar Tyme’	Sugar Tyme Crabapple	▽	▽	▽	▽	▽	▽
LARGE SHRUBS							
Eunonymous alatus ‘Compactus’ *	Dwarf Burning Bush	▽	▽	▽	▽	▽	▽
Viburnum x dentatum	Arrowwood Viburnum	▽	▽	▽	▽	▽	▽
Viburnum dilatatum	Linden Viburnum	▽	▽	▽	▽	▽	▽
Viburnum plicatum var. toment.	Doublefile Viburnum	▽	▽	▽	▽	▽	▽
Viburnum x rhytid. Willowood'	Willowood Viburnum	▽	▽	▽	▽	▽	▽
MEDIUM SHRUBS							
Berberis mentorensis**	Mentor Barberry	▽	▽	▽	▽	▽	▽
Berberis thunbergii atropurea**	Japanese Red Barberry	▽	▽	▽	▽	▽	▽
Buxus microphylla var. korean*	Korean Boxwood	▽	▽	▽	▽	▽	▽
Cotoneaster divaricata	Spreading Cotoneaster	▽	▽	▽	▽	▽	▽
Ilex glabra ‘Compacta’*	Compact Inkberry Holly	▽	▽	▽	▽	▽	▽
Pinus mugo var. mugo	Mugo Pine	▽	▽	▽	▽	▽	▽
Taxus x media ‘Densiformis’ *	Densiformis Yew	▽	▽	▽	▽	▽	▽
SMALL SHRUBS							
Cotoneaster apiculatus	Cranberry Cotoneaster	▽	▽	▽	▽	▽	▽
Juniiper horizontalis spp. horizontalis	Horizontal Juniper	▽	▽	▽	▽	▽	▽
Juniiper procumbens	Japargarden Juniper	▽	▽	▽	▽	▽	▽
Spirea x bumalda	Anthony Waterer Spirea	▽	▽	▽	▽	▽	▽
Spirea japonica	Japanese Spirea	▽	▽	▽	▽	▽	▽
GROUND COVERS							

PLANT SELECTION LIST														
Plant Material Suitability Matrix														
BATTAL'N RECEPTION & SPECIAL TRAINING														
* Indicates poisonous **Indicates thorned														
Botanical Name	Common Name	Notes												
Euonymus fortunei 'Coloratus' *	Purpleleaf Wintercreeper	Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow
Hedera helix x 'Baltic'*	Baltic Ivy	Δ	Δ							Δ				
Vinea minor	Common Periwinkle	Δ	Δ							Δ				
GRASSES														
Festuca elatior 'Jaguar' *	Jaguar Turf-type Tall Fescue	Δ												

SMALL TREES							
Magnolia x soulangiana	Saucer Magnolia	▽	▽	▽	▽	▽	▽
Malus x 'Bob White'	Bob White Crabapple	▽	▽	▽	▽	▽	▽
Malus x 'Mary Potter'	Mary Potter Crabapple	▽	▽	▽	▽	▽	▽
Malus x 'Prairiefire	Prairiefire Crabapple	▽	▽	▽	▽	▽	▽
Malus x 'Red Jewel'	Red Jewel Crabapple	▽	▽	▽	▽	▽	▽
Malus x 'Donald Wyman'	Donald Wyman Crabapple	▽	▽	▽	▽	▽	▽
Malus x 'Sugar Tyme'	Sugar Tyme Crabapple	▽	▽	▽	▽	▽	▽
LARGE SHRUBS							
Eunonymous alatus 'Compactus' *	Dwarf Burning Bush	▽	▽	▽	▽	▽	▽
Viburnum x dentatum	Arrowwood Viburnum	▽	▽	▽	▽	▽	▽
Viburnum dilatatum	Linden Viburnum	▽	▽	▽	▽	▽	▽
Viburnum plicatum var. toment.	Doublefile Viburnum	▽	▽	▽	▽	▽	▽
Viburnum x rhytid.' Willowood'	Willowwood Viburnum	▽	▽	▽	▽	▽	▽
MEDIUM SHRUBS							
Berberis mentorensis**	Mentor Barberry	▽	▽	▽	▽	▽	▽
Berberis thunbergii atropurpurea**	Japanese Red Barberry	▽	▽	▽	▽	▽	▽
Buxus microphylla var. koreana*	Korean Boxwood	▽	▽	▽	▽	▽	▽
Cotoneaster divaricata	Spreading Cotoneaster	▽	▽	▽	▽	▽	▽
Ilex glabra 'Compacta'*	Compact Inkberry Holly	▽	▽	▽	▽	▽	▽
Pinus mugo var. mugo	Mugo Pine	▽	▽	▽	▽	▽	▽
Taxus x media 'Densiflormis' *	Densiformis Yew	▽	▽	▽	▽	▽	▽
SMALL SHRUBS							
Cotoneaster apiculatus	Cranberry Cotoneaster	▽	▽	▽	▽	▽	▽
Japiperus horizontalis spp.	Horizontal Juniper	▽	▽	▽	▽	▽	▽
Juniperus procumbens	Jagarden Juniper	▽	▽	▽	▽	▽	▽
Spirea x bumalda	Anthony Waterer Spirea	▽	▽	▽	▽	▽	▽
Shrub japonica	Japanese Spirea	▽	▽	▽	▽	▽	▽

[illegible]

PLANT SELECTION LIST								
Plant Material Suitability Matrix								
<div>SUPPLY FACILITIES<div>* Indicates poisonous**Indicates thorned</div></div>								
Botanical Name		Common Name						
LARGE TREES								
Acer saccharum								Sugar Maple
Betula nigra								River Birch
Celtis laevigata								Sugar Hackberry
Fraxinus americana								White Ash
Fraxinus pennsylvanica								Green Ash
Ginkgo biloba* (male)								Gingko biloba (male)
Liquidambar s. ‘Rotundiloba’								Fruitless Sweetgum
Quercus phellos*								Willow Oak
Quercus rubra*								Northern Red Oak
Taxodium distichum								White Pine
Bald Cypress								Bald Cypress
MEDIUM TREES								
Acer platanoides								Norway Maple
Acer rubrum*								Red Maple

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PLANT SELECTION LIST		Plant Type	Shape				Growth Rate	Flower-ing		Special Interest	Soil Conditions				Expos-ure	Toler-ance	Functional Uses																					
Plant Material Suitability Matrix		Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier
SUPPLY FACILITIES																																						
Botanical Name	Common Name																																					
Crataegus viridis ‘Winter King’**	Winter King Hawthorn	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Red berries, Thorns
Juniperus virginiana	Eastern Red Cedar	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify ‘Taylor’, ‘Burkii’, ‘Emerald’ ‘Sentinel’, or ‘Greenspire’	
LARGE SHRUBS																																						
Cornus sericea	Red-osier Dogwood	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify ‘Cardinal’, ‘Bailey’, ‘Coloradenis’, or ‘Cheyenne’ for reddest stems	
Forsythia intermedia ‘Compact’	Border Forsythia	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify ‘Karl Sax’ or ‘Spring Glory’		
Rhus typhina	Staghorn Sumac	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify ‘Dissecta’ and ‘Laciniata’		
Viburnum x burkwoodii	Burkwood Viburnum	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Taller than it is wide		
Viburnum x dentatum	Arrowwood Viburnum	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Makes a good hedge		
Viburnum opulus	Cranberrybush Viburnum	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Makes a good hedge, red berries		
MEDIUM SHRUBS																																						
Berberis mentorensis**	Mentor Barberry	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Makes a good hedge	
Berberis thunbergii	Japanese Red Barberry	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify ‘Crimson Pygmy’ or ‘Rose Glow’	
Berberis thunbergii	Japanese Red Barberry	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽		
Cotoneaster divaricata	Spreading Cotoneaster	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	Specify ‘Green Globe’	
Rhus aromatica	Fragrant Sumac	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽		
Viburnum opulus ‘Compact’	Compact Cranberrybush	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽	▽		

PLANT SELECTION LIST															
Plant Material Suitability Matrix															
SUPPLY FACILITIES															
* Indicates poisonous **Indicates thorned															
Botanical Name		Common Name		Notes											
Ilex glabra 'Compacta'*		Compact Inkberry Holly		Specify 'Compacta' or 'Shamrock'											
SMALL SHRUBS															
Juniperus horizontalis spp.		Horizontal Juniper													
Juniperus procumbens		Japgarden Juniper													
Rhus aromatica 'Gro-Low'		Gro-Low Sumac		Specify 'Nana' or 'Greenmound'											
Spirea x bumalda		Anthony Waterer Spirea		Also specify 'Goldflame'											
Spirea japonica		Japanese Spirea		'Little Princess', 'Shirobana', 'Goldmound'											
GROUND COVERS															
Coronilla varia		Crown Vetch		Low maintenance bank cover											
Euonymus fortunei 'Coloratus'*		Purpleleaf Wintercreeper		Vigorous grower, semi-evergreen											
GRASSES															
Schizachyrium scoparium		Little Blue Stem													
Festuca elatior 'Jaguar'		Jaguar Turftype Tall Fescue													
Andropogon gerardii		Big Bluestem													
Panicum heterolepis		Prairie Dropseed													
Sorghastrum nutans 'Sioux Blue'		Sioux Blue Indian Grass		Specify 'Sioux Blue' for blue foliage											

[illegible]

[illegible]

PLANT SELECTION LIST		Plant Type	Shape			Growth Rate			Flower-ing			Special Interest	Soil Conditions						Expos-ure	Toler-ance	Functional Uses																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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LOGISTICS		Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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Friday, June 25, 2010

PLANT SELECTION LIST Plant Material Suitability Matrix																																									
Botanical Name	Common Name	Plant Characteristics																																							
		Plant Type	Shape				Growth Rate			Flowering			Special Interest																												
Soil Conditions	Exposure	Tolerance	Functional Uses						Notes																																
			Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier		
WATER TREATMENT																																									
* Indicates poisonous **Indicates thorned																																									
LARGE TREES																																									
Acer saccharum	Sugar Maple	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'Legacy'		
Betula nigra	River Birch	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'Heritage', soil pH less than 6.5		
Celtis laevigata	Sugar Hackberry	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'All Seasons' or 'Magnifica'		
Fraxinus americana	White Ash	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'Autumn Applause' or 'Autumn Purple'		
Fraxinus pennsylvanica	Green Ash	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'Summit' or 'Marshall Seedless'		
Ginkgo biloba* (male)	Ginkgo biloba (male)	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify male to avoid messy fruit		
Liquidambar s. 'Rotundiloba'	Fruitless Sweetgum	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Fruitless variety of American Sweetgum		
Quercus phellos*	Willow Oak	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Develops iron chlorosis in high pH soils		
Quercus rubra*	Northern Red Oak	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Develops iron chlorosis in high pH soils		
Pinus strobus	White Pine	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ			
Taxodium distichum	Bald Cypress	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ			
MEDIUM TREES																																									
Acer platanoides	Norway Maple	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'Columnare' or 'Summershade'		
Acer rubrum*	Red Maple	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Specify 'Red Sunset', 'October Glory' or 'Armstrong'		
Larpinus caroliniana	American Hornbeam	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Has smooth "beech-like" bark		

PLANT SELECTION LIST			Plant Type	Shape				Growth Rate		Flower-ing		Special Interest		Soil Conditions				Expos-ure		Toler-ance		Functional Uses																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Plant Material Suitability Matrix			Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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	Gleditsia triacanthos 'inermis'*	Thornless Honeylocust	▽	▽							▽									▽	▽						▽				▽	▽									Specify 'Moraine' or 'Shademaster'																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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WATER TREATMENT

****Indicates thorned**

Fort Leonard Wood IDG

PLANT SELECTION LIST		Plant Material Suitability Matrix																																				
Botanical Name	Common Name	Plant Characteristics										Plant Culture					Landscape Use					Notes																
		Plant Type	Shape			Growth Rate			Flowering		Special Interest	Soil Conditions			Exposure		Tolerance	Functional Uses																				
* Indicates poisonous **Indicates thorned		Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier
SMALL SHRUBS																																						
Juniperus horizontalis spp.	Horizontal Juniper	▽											▽					▽				▽																
Juniperus procumbens	Japgarden Juniper	▽											▽					▽				▽																
Rhus aromatica 'Gro-Low'	Gro-Low Sumac	▽	▽							▽				▽					▽			▽														Specify 'Nana' or 'Greenmound'		
Spirea x bumalda	Anthony Waterer Spirea	▽				▽						▽							▽			▽														'Little Princess', 'Shirobana', 'Goldmound'		
Spirea japonica	Japanese Spirea	△										▽					▽					△																
GROUND COVERS																																						
Coronilla varia	Crown Vetch	▽										▽					▽			▽																Low maintenance bank cover		
Euonymus fortunei 'Coloratus' *	Purpleleaf Wintercreeper		△									▽						▽			▽	▽	▽	▽	▽	▽	▽	▽					▽			Vigorous grower, semi-evergreen		
GRASSES																																						
Schizachyrium scoparium	Little Blue Stem	▽		▽									▽					▽				▽				▽												
Festuca elatior 'Jaguar'	Jaguar Turf-type Tall Fescue	△			▽							▽										▽				▽												
Andropogon gerardii	Big Bluestem	▽	▽		▽							▽						▽				▽				▽												
Sporobolus heterolepis	Prairie Dropseed	△	▽			▽							▽					▽				▽				▽												
Sorghastrum nutans 'Sioux Blue'	Sioux Blue Indian Grass	▽						▽					▽					▽				▽				▽					▽					Specify 'Sioux Blue' for blue foliage		

PLANT SELECTION LIST																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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PLANT SELECTION LIST																																					
Plant Material Suitability Matrix																																					
Botanical Name	Common Name	Plant Characteristics											Plant Culture				Landscape Use				Notes																
		Plant Type	Shape					Growth Rate			Flower-ing			Special Interest		Soil Conditions				Expos-ure		Toler-ance		Functional Uses													
Deciduous	Evergreen	Native	Conical	Columnar	Round/Oval	Weeping	Upright	Spreading	Irregular	Fast	Moderate	Slow	Spring	Summer	Fall	Foliage	Fruit	Fall Color	Moist	Average	Dry	Acidic	Alkaline	Sun	Part Shade	Full Shade	Pest Resistant	Drought Resistant	Pollution Tolerant	Specimen	Street Tree	Massing	Screen/Windbreak	Parking Lot	Park/Lawn	Barrier	
* Indicates poisonous **Indicates thorned																																					
Juniperus virginiana	Eastern Red Cedar	▽	▽	▽							▽					▽			▽	▽	▽	▽	▽													Specify 'Taylor', 'Burkii', 'Emerald', 'Sentinel', or 'Greenspire'	
LARGE SHRUBS																																					
Cornus sericea	Red-osier Dogwood	▽	▽					▽					▽				▽		▽	▽					▽	▽										Specify 'Cardinal', 'Bailey', 'Coloradenis', or 'Cheyenne' for reddest stems	
Forsythia intermedia 'Compact'	Border Forsythia	▽					▽						▽						▽	▽															Specify 'Karl Sax' or 'Spring Glory'		
Rhus typhina	Staghorn Sumac	▽	▽						▽								▽		▽	▽															Specify 'Dissecta' and 'Laciniata'		
Viburnum x burkwoodii	Burkwood Viburnum	▽	▽						▽				▽				▽		▽	▽															Taller than it is wide		
Viburnum x dentatum	Arrowwood Viburnum	▽	▽						▽				▽				▽		▽	▽															Makes a good hedge		
Viburnum opulus	Cranberrybush Viburnum	▽	▽						▽				▽				▽		▽	▽															Makes a good hedge, red berries		
MEDIUM SHRUBS																																					
Berberis mentorensis**	Mentor Barberry	▽			▽						▽				▽			▽	▽						▽	▽	▽	▽								Makes a good hedge	
Berberis thunbergii	Japanese Red Barberry	▽			▽							▽				▽		▽	▽																Specify 'Crimson Pygmy' or 'Rose Glow'		
4 Tropaeura**		▽																																			
Cotoneaster divaricata	Spreading Cotoneaster	▽							▽				▽				▽		▽	▽																Specify 'Green Globe'	
Rhus aromatica	Fragrant Sumac	▽	▽														▽		▽	▽																	
Viburnum opulus 'Compact'	Compact Cranberrybush	▽	▽										▽				▽		▽	▽																	
2 R. glabra 'Compacta'	Compact Inkberry Holly	▽	▽													▽			▽	▽																Specify 'Compacta' or 'Shamrock'	

PLANT SELECTION LIST		Plant Material Suitability Matrix	Plant Type	Shape			Growth Rate		Flower-ing		Special Interest		Soil Conditions			Expos-ure		Toler-ance		Functional Uses					Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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PUBLIC WORKS

Fort Leonard Wood IDG

PUBLIC WORKS

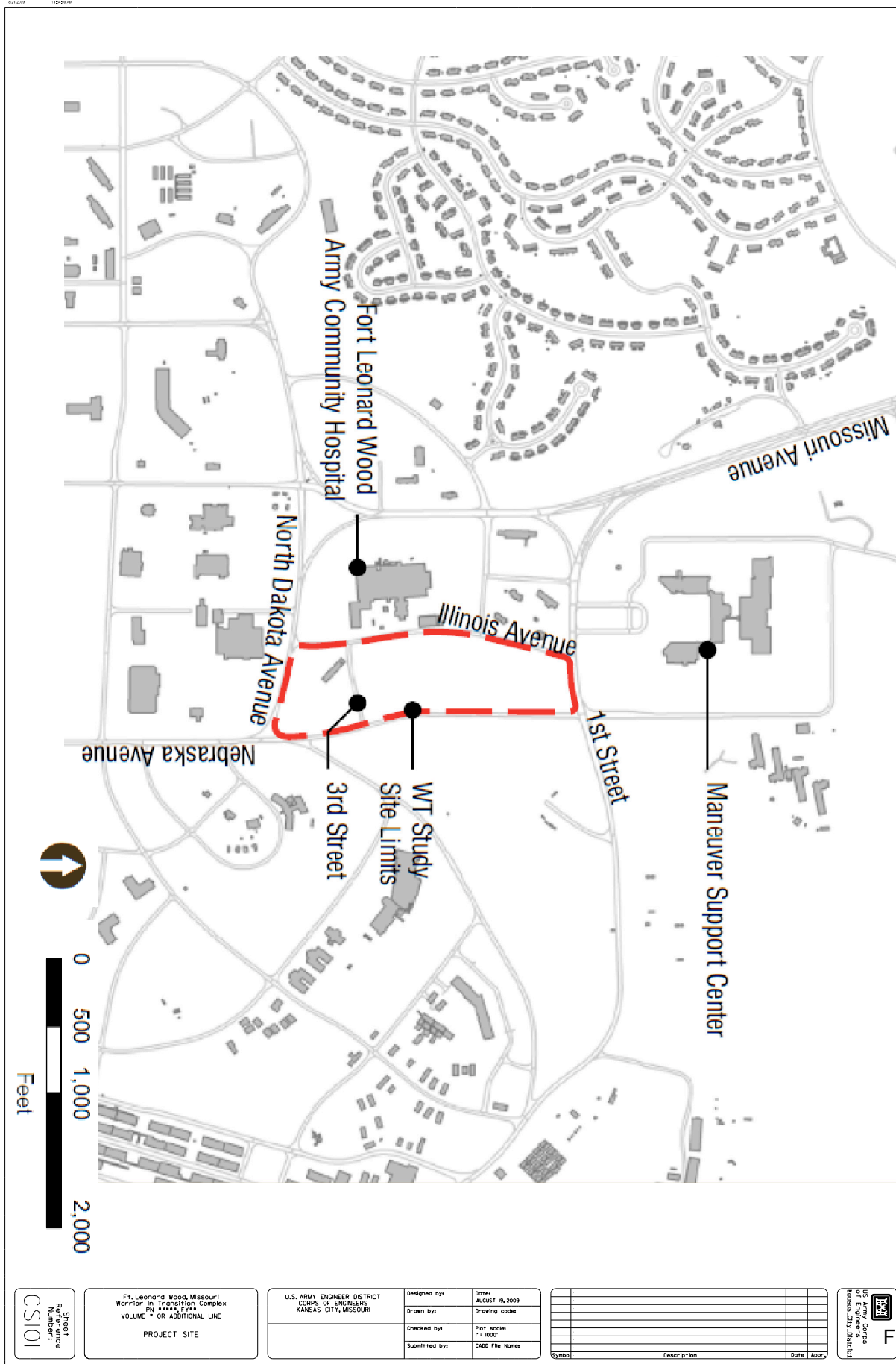
Fort Leonard Wood IDG

Links

[Go to Appendix P](#)

[Go to Table of Contents](#)

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Friday, June 25, 2010

LEGEND

- A PRIMARY SURFACE
- B CLEAR ZONE SURFACE
- C APPROACH-DEPARTURE CLEARANCE SURFACE (SLOPE)
- H TRANSITIONAL SURFACE (SLOPE)

SITE SURVEY WITH HELIPAD AIRSPACE OVERLAY

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI		Designed by: AMC/SST/JG00009
Drawn by:		Drawing codes:
Checked by:		Plot scales: r = 300'
Submitted by:		CADD File Name:

Symbol	Description	Date	Appr.

CG501

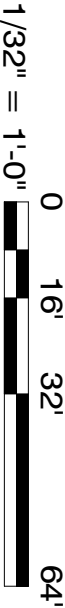
Sheet Number

Ft. Leonard Wood, Missouri
Warrior in Transition Complex
PH ***** F***
VOLUME * OR ADDITIONAL LINE

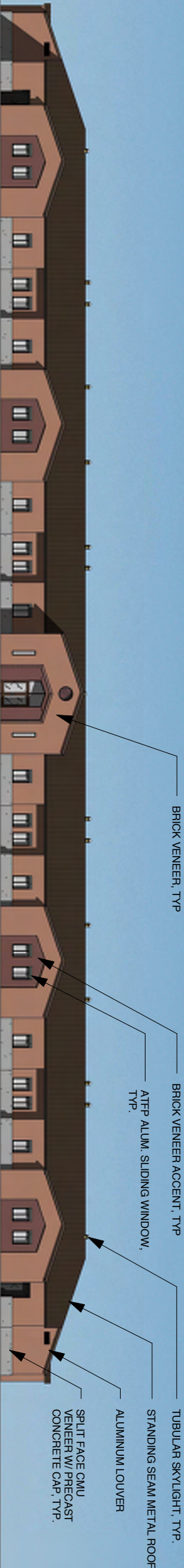
US Army Corps of Engineers
Kansas City District

Friday, June 25, 2010

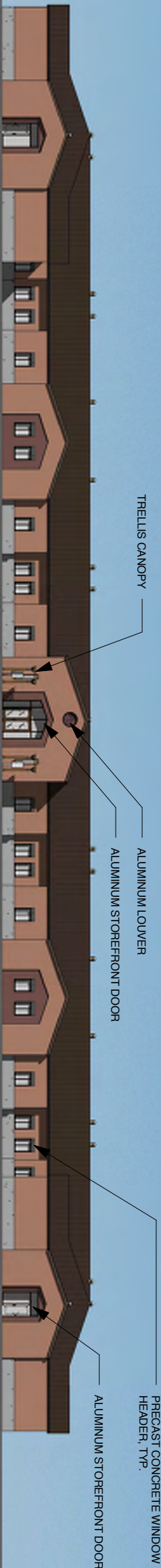
ELEVATIONS



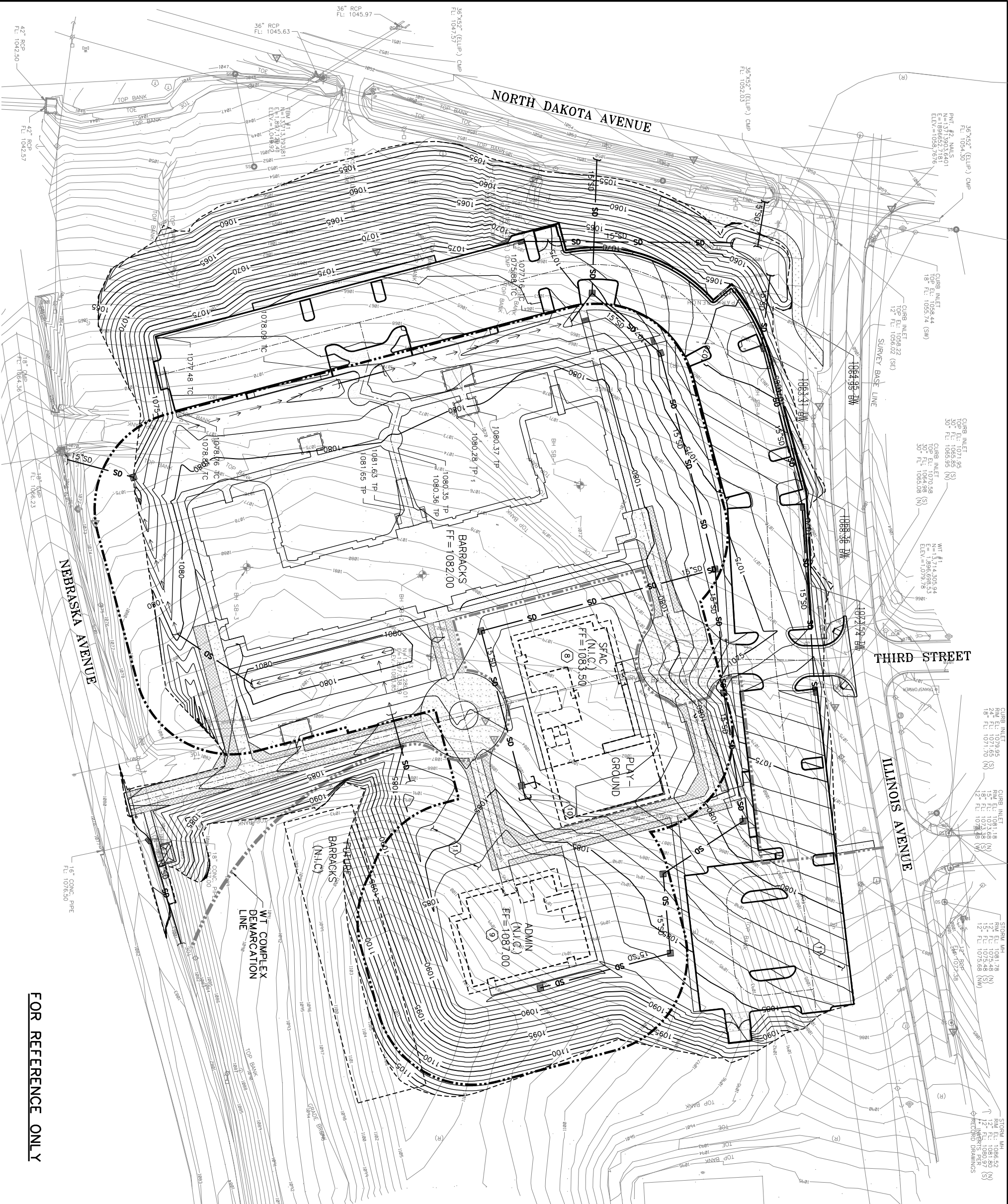
NORTH ELEVATION



SOUTH ELEVATION



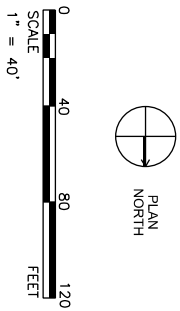
WT Complex Barracks and Site - Design Concept



FOR REFERENCE ONLY

- KEY NOTES**
1. DOWNSPOUT LOCATION - SEE ARCHITECTURAL PLANS FOR CONTINUATION.
 2. STORM DRAIN PIPE - SIZE AS NOTED.
 3. DRAINAGE INLET PER DETAIL XX ON SHEET CU501 AREA IS 2X.
 4. MAXIMUM SLOPE WITHIN ADA ACCESS
 5. 10" WIDE ROCK LINING WITH MIN. 6" DIA. SIZE AND 12" DEPTH.
 6. FLARED END SECTION, SEE DETAIL X ON SHEET CU501.
 7. ADJUST EXISTING STRUCTURE TO PROPOSED GRADE
 8. GRADE SFAC BUILDING PAD TO 1084.5
 9. GRADE HQ BUILDING PAD TO 1083.5
 10. STORM DRAIN STUB OUT FOR SFAC/ADMIN ROOF DRAIN CONNECTION.
 11. BY PHASE TO GENERAL CONTRACTOR, N.I.C.
- LEGEND**
- LIMITS OF DISTURBANCE

- GENERAL NOTES**
1. GRADES AND CONTOURS SHOWN ARE FINAL GRADES.
 2. TOP OF CURB ELEVATION IS TYPICAL, 6" ABOVE PAVEMENT ELEVATION UNLESS NOTED OTHERWISE.
 3. SEE SHEET G101 FOR SURVEY CONTROL INFORMATION.
 4. FOR GRADING RECOMMENDATIONS SEE GEOTECHNICAL INVESTIGATION REPORT FOR FORT LEONARD WOOD BARRACKS COMPLEX, PREPARED BY TERRACON, DATED AUGUST 13, 2009.
 5. GRADING AT STRUCTURAL AREAS, REMOVE THE UPPER 24 INCHES MINIMUM OF EXISTING GROUND AND REPLACE WITH COMPACTED ENGINEERED FILL TO AT LEAST 95 PERCENT IN THE SUBGRADE WITH MAXIMUM 157.0% RELATIVE COMPACTION IN THE SUBGRADE. THE REMAINING 157.0% RELATIVE COMPACTION IN THE PERMETER FOOTINGS ACTUAL DEPTH OF REMOVAL MAY EXTEND DEEPER AND SHOULD BE EVALUATED DURING GRADING BY THE GEOTECHNICAL CONSULTANT.
 6. GRADING AT NON-STRUCTURAL AREAS: (1) AT AREAS TO RECEIVE FILL, OR IN AREAS AT PROPOSED GRADE, THE UPPER 6 INCHES SHOULD BE REMOVED AND THE EXPOSED BOTTOM SHOULD BE SCARIFIED TO A DEPTH OF 6 INCHES. MOISTURE CONDITIONED AND RECOMPACTED TO AT LEAST 90 PERCENT OF LABORATORY MAXIMUM DRY DENSITY PRIOR TO REPLACING FILL. (2) AT CUT AREAS, SUBSEQUENT TO GRADING, EXPOSED SUBGRADE SHOULD BE EVALUATED.
 7. DRY DENSITY DETERMINED IN ACCORDANCE WITH ASTM D1557-07.



FORT LEONARD WOOD, MISSOURI
PN 71543, FY2010
WT COMPLEX BARRACKS AND SITE

GRADING PLAN

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
FORT LEONARD WOOD, MISSOURI

Mortenson
700 MEADOW LANE N. 505 • 14TH STREET, SUITE 1000
MINNEAPOLIS, MN 55422 OAKLAND, CA 94612

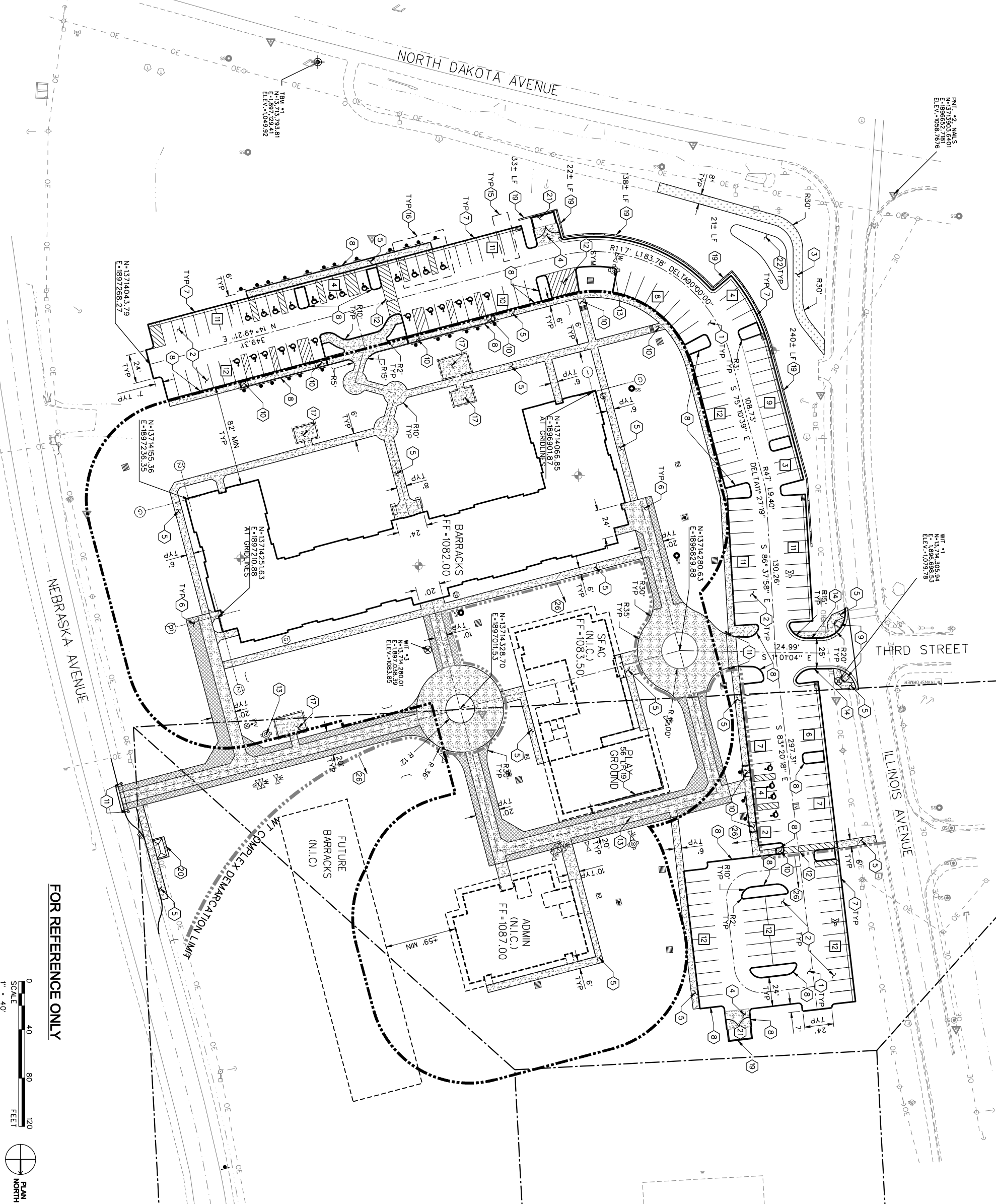
Designed by: JC
Drawn by: JJH
Checked by: RC
Submitted by: --
Date: 6/16/2010
File no. X
Plot scale: AS SHOWN
CADD File Name: W71543-BKS-BLD01-CG-101.dgn

Symbol	Description	Date	Appr.
100% PACKAGE A SUBMITTAL		06/21/10	

Friday, June 25, 2010

US Army Corps of Engineers
Kansas City District

Sheet Reference Number: CG101
Sheet of XXX



GENERAL NOTES:

1. MICROSTATION CAD FILES WILL BE MADE AVAILABLE FOR HORIZONTAL LAYOUT.
2. PARKING TABLE INCLUDES PARKING COUNT FOR EXISTING AND PROPOSED.
3. FOR SITE LIGHTING, SEE ELECTRIC PLANS

KEY NOTES:

1. STANDARD DUTY ASPHALT CONCRETE PAVEMENT PER DETAIL 11 ON SHEET CSS02.
2. LIGHT DUTY ASPHALT CONCRETE PAVEMENT PER DETAIL 11 ON SHEET CSS02.
3. ASPHALT CONCRETE SIDEWALK TO MATCH EXISTING.
4. UTILITY PAD/CONCRETE APRON PER DETAIL 9 ON SHEET CSS02.
5. CONCRETE SIDEWALK PER DETAIL 6 ON SHEET CSS01.
6. FIRE SERVICE VEHICLE ACCESS LANE.
7. ROLLED CURB, SEE DETAIL 11 AND 12 ON SHEET CSS01.
8. CURB PER DETAIL 8 ON SHEET CSS01.
9. CURB RAMP PER DETAIL 10 ON SHEET CSS01.
10. RAMP PER DETAIL 2 ON SHEET CSS01.
11. BOLLARDS WITH CHAIN AND LOCK PER DETAIL 6 ON SHEET CSS02, PROVIDE LOCK PER FIRE DEPARTMENT REQUIREMENTS.
12. 4" WIDE GROSSWALK STRIPING AT 3' O.C.
13. FIRE HYDRANT LOCATION.
14. FIRE LANE RED CURB MARKING
15. PARKING STALL 9.5'X20', SEE DETAIL 5 ON SHEET CSS02.
16. ACCESSIBLE PARKING STALL, SEE DETAIL 1, 2 & 7 ON SHEET CSS02, DETAIL 10 ON SHEET CSS01.
17. COURTYARD, SEE ARCHITECTURAL SHEETS.
18. DRAINAGE FEATURE, SEE GRADING SHEETS FOR ELEVATION INFORMATION.
19. INTERLOCKING BLOCK WALL, SEE GRADING SHEETS FOR HEIGHT.
20. BUS SHELTER, SEE ARCHITECTURAL SHEETS.
21. TRASH ENCLOSURE SLOPED FOR DRAINAGE AND ACCESS, SEE ARCHITECTURAL SHEET FOR DETAIL.
22. PROPOSED DRAINAGE FEATURE, SEE GRADING SHEET.
23. LOW EMISSION OR FUEL EFFICIENT VEHICLE PARKING AREA DETAIL 3 AND 5 ON SHEET CSS01 FOR SIGNAGE LOCATION AND DETAIL.
24. CARPOOL PARKING AREAS, SEE DETAIL 3 AND 5 ON SHEET CSS02 FOR SIGNAGE LOCATION AND DETAIL.
25. DESIGNATED SMOKING AREA SIGN
26. LANDSCAPE BY PHASE 2 CONTRACTOR, N.I.C.

LEGEND:

- [X] PARKING STALL COUNT
- (A) BUILDING COLUMN LINE

GRASSCOTE TYPE GC2/FIRE VEHICLE PATHWAY
SEE DETAIL 10 ON SHEET CSS02.

POC PAVEMENT/FIRE SERVICE VEHICLE PATHWAY
SEE DETAIL 12 ON SHEET CSS02.

CONCRETE SIDEWALK
SEE DETAIL 4 AND 7 ON SHEET CSS01.

LIGHT DUTY ASPHALT PAVING
SEE DETAIL X ON SHEET CSS01.

STANDARD DUTY ASPHALT PAVING
SEE DETAIL X ON SHEET CSS01.

82' STANDOFF DISTANCE

AIR SPACE CLEARANCE BOUNDARY

WT COMPLEX DEMARCATION LIMIT

PARKING TABLE

	STANDARD	ADA	TOTAL
BARRACKS	24	24	48
ADMIN BUILDING	65	2	67
SFAC BUILDING	51	2	53
TOTAL PARKING SPACES:			168

SITE PLAN

FORT LEONARD WOOD, MISSOURI
PN 71543, FY2010
WT COMPLEX BARRACKS AND SITE

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
FORT LEONARD WOOD, MISSOURI

Mortenson Construction
700 MEADOW LAKE BLVD
MINNEAPOLIS, MN 55422

Trans Systems
505 - 14TH STREET, SUITE 1000
OAKLAND, CA 94612

Designed by:
JC

Drawn by:
JHH

Checked by:
RC

Submitted by:
--

Date:
6/16/2010

File no.
X

Plot scale:
AS SHOWN

CADD File Name:
W17543-BKS-BL001-CS-101.dgn

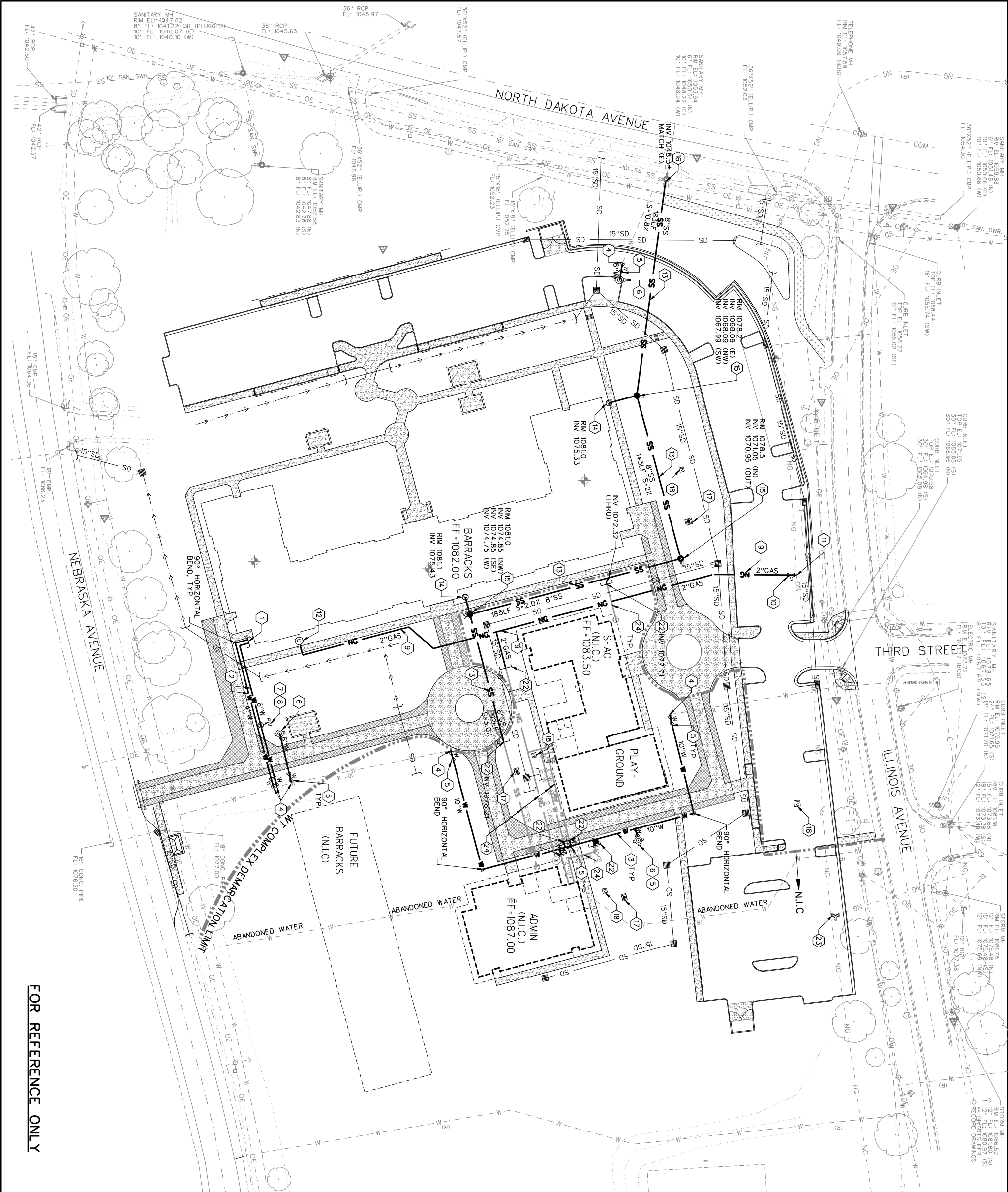
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Friday, June 25, 2010

US Army Corps of Engineers
Kansas City District

Sheet
Reference
Number:
CS101

Sheet
of XXX



FOR REFERENCE ONLY

- GENERAL NOTES:**
- FOR ADDITIONAL UTILITY NOTES SEE SHEET G003.
 - ELECTRICAL/COMMUNICATION LINES ARE SHOWN FOR REFERENCE ONLY. SEE ELECTRICAL SHEETS FOR LIGHTING/ELECTRICAL SERVICE AND COMMUNICATIONS ROUTING.
 - SEE CDDI GRADING SHEET FOR PROPOSED STORM DRAIN DESIGN.
 - FOR FIRE WATER AND DOMESTIC WATER PLACED IN SAME UTILITY TRENCH, LOCATION OF BACKFLOW DEVICE WILL BE INSIDE BUILDING MECHANICAL ROOM AND WITH METERING DEVICE.
 - CONTRACTOR SHALL POITHOLE EXISTING UTILITY CONNECTION POINTS FOR LOCATION AND DEPTH PRIOR TO STARTING CONSTRUCTION.
- CONSTRUCTION KEY NOTES:**
- WATER METER ASSEMBLY INSIDE BUILDING. SEE MECHANICAL SHEETS.
 - DOMESTIC OR FIRE WATER SERVICE LATERAL.
 - 10" WATER LINE.
 - TAP TO EXISTING WATER MAIN.
 - WATER VALVE AND VALVE BOX.
 - FIRE HYDRANT ASSEMBLY AND 6" WATER LINE. PROVIDE BOLLARD AS REQUIRED.
 - FIRE DEPARTMENT CONNECTION. SEE MECHANICAL SHEETS.
 - POST INDICATOR VALVE.
 - GAS LINE PROVIDED BY OMEGA PIPELINE COMPANY. SEE PLAN FOR SIZE.
 - GAS VALVE IN VALVE BOX. PROVIDED BY OMEGA PIPELINE COMPANY.
 - GAS LINE POINT OF CONNECTION. PROVIDED BY OMEGA PIPELINE COMPANY.
 - GAS METER WITH CONCRETE PAD PROVIDED BY OMEGA PIPELINE COMPANY.
 - SANITARY SEWER, SEE PLAN FOR SIZE.
 - SANITARY SEWER CLEANOUT.
 - SANITARY SEWER MANHOLE.
 - CONNECT TO EXISTING SANITARY SEWER MANHOLE. MODIFY STRUCTURE AS NEEDED.
 - ELECTRICAL TRANSFORMER AND PAD. SEE ELECTRICAL SHEETS.
 - COMMUNICATIONS STRUCTURES AND LINES. SEE ELECTRICAL SHEETS.
 - UNDERGROUND ELECTRICAL SERVICE AND TRANSFORMER BY OTHERS.
 - 2" IRRIGATION LINE POINT OF CONNECTION.
 - 30LF, 2-6" SLEEVES FOR PLUMBING CONDUITS.
 - UTILITY STUB-OUT FOR SFAC/ADMIN BUILDINGS.
 - ADJUST EXISTING UTILITY STRUCTURE TO NEW GRADE.
 - UTILITY DESIGNED AND PROVIDED BY PHASE 2 CONTRACT, N.I.C.

LEGEND

- SD - EXISTING STORM DRAIN LINE
- SD - PROPOSED STORM DRAIN LINE
- E - EXISTING OVERHEAD ELECTRICAL LINE
- OE - EXISTING OVERHEAD ELECTRICAL LINE
- W - EXISTING WATER LINE
- W - PROPOSED WATER LINE
- NG - EXISTING NATURAL GAS LINE
- NG - PROPOSED NATURAL GAS LINE
- SS - EXISTING SANITARY SEWER LINE
- SS - PROPOSED SANITARY SEWER LINE
- T - EXISTING TELECOM LINE
- COM - EXISTING COMMUNICATION LINE
- NEW GAS VALVE
- NEW GAS METER
- NEW WATER VALVE
- NEW FIRE HYDRANT
- NEW POST INDICATOR VALVE
- NEW CLEANOUT
- NEW SANITARY SEWER MANHOLE
- NEW STORM DRAIN INLET
- NEW ELECTRICAL TRANSFORMER
- INSTALL THRUST BLOCK PER DETAILS AND SPECIFICATIONS
- NEW COMMUNICATION STRUCTURE
- NEW DITCH/SWALE FLOW DIRECTION
- (R) RECORD INFORMATION
- SS - (N.I.C.) PROPOSED SANITARY SEWER LINE
- NG - (N.I.C.) PROPOSED NATURAL GAS LINE
- W - (N.I.C.) PROPOSED WATER LINE

SCALE 1" = 40'

PLAN NORTH

FORT LEONARD WOOD, MISSOURI
PN 71543, FY2010
WT COMPLEX BARRACKS AND SITE

UTILITY PLAN

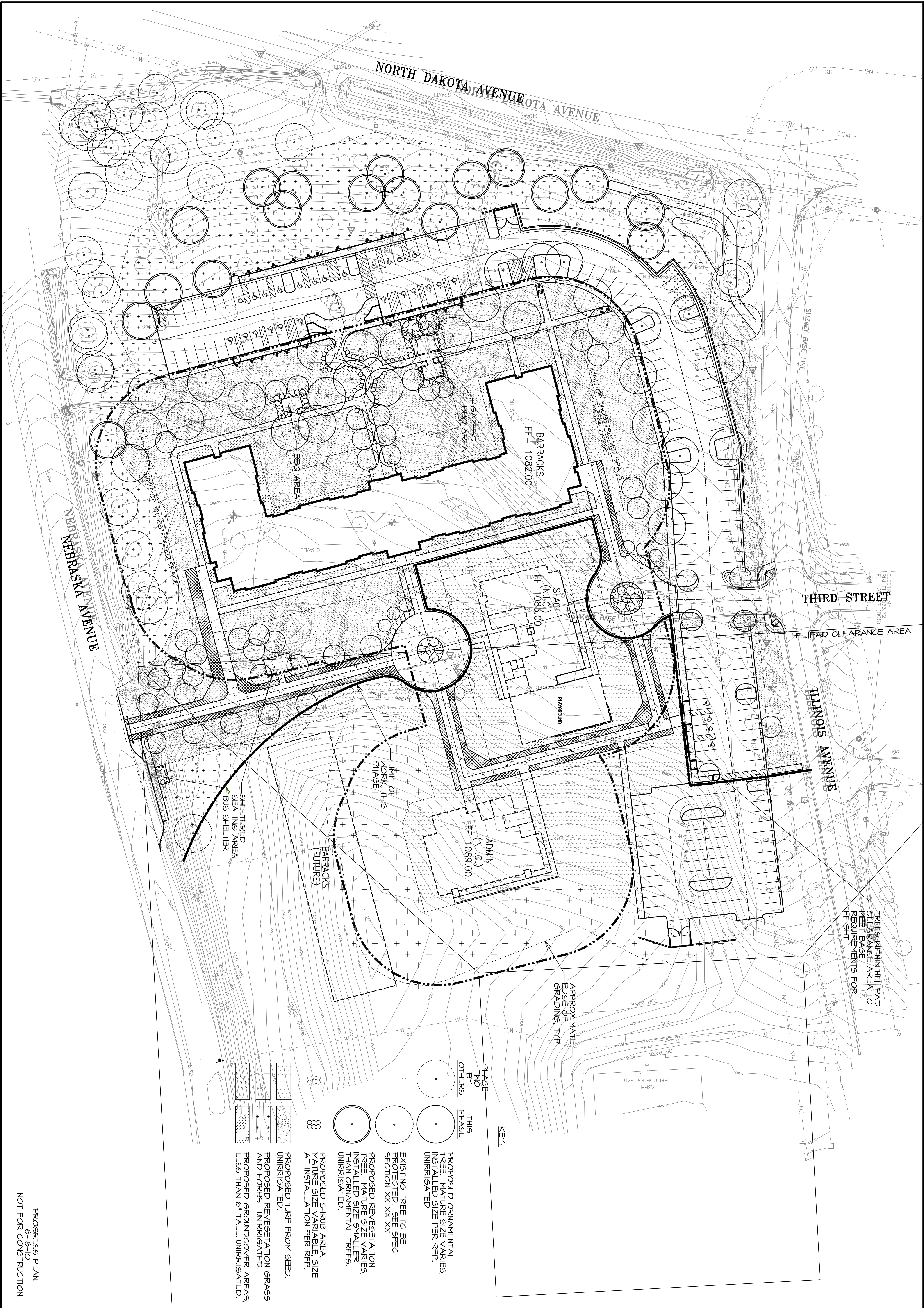
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
FORT LEONARD WOOD, MISSOURI

Mortenson Construction
700 MEADOW LAKE BLVD
MINNEAPOLIS, MN 55422

Tran Systems
505 - 14TH STREET, SUITE 1000
OAKLAND, CA 94612

Designed by: JC	Date: 6/16/2010
Drawn by: JHH	File no. X
Checked by: RC	Plot scale: AS SHOWN
Submitted by: --	CADD File Name: W17543.BKS-BL001-CU-101.dgn

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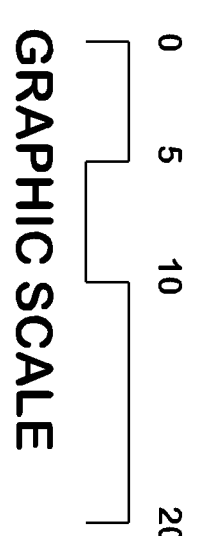
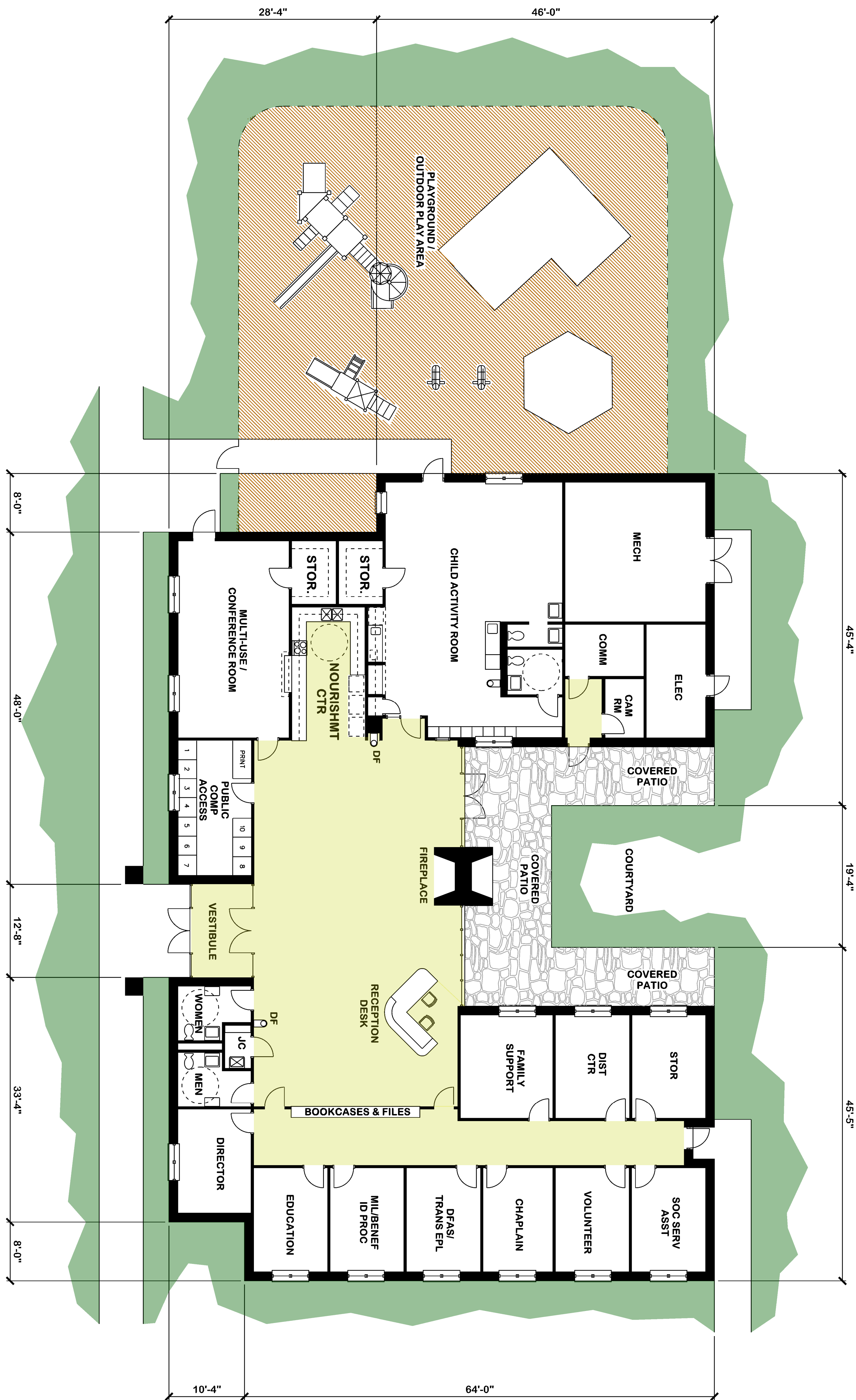
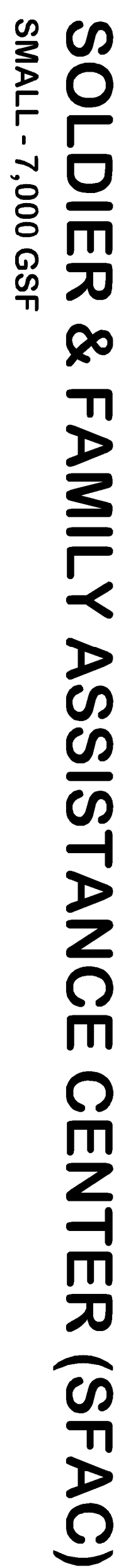
	PHASE TWO		THIS PHASE
	OTHERS		EXISTING TREE TO BE PROTECTED. SEE SPEC SECTION XX XX XX
	PROPOSED ORNAMENTAL TREE. MATURE SIZE VARIES, INSTALLED SIZE PER RFP. UNIRRIGATED		PROPOSED REVEGETATION TREE. MATURE SIZE VARIES, INSTALLED SIZE SMALLER THAN ORNAMENTAL TREES. UNIRRIGATED.
	PROPOSED SHRUB AREA, MATURE SIZE VARIABLE, SIZE AT INSTALLATION PER RFP.		PROPOSED TURF FROM SEED, UNIRRIGATED.
	PROPOSED REVEGETATION GRASS AND FORBS. UNIRRIGATED.		PROPOSED GROUNDCOVER AREAS, LESS THAN 6" TALL, UNIRRIGATED.

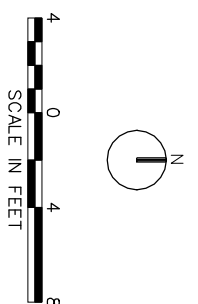
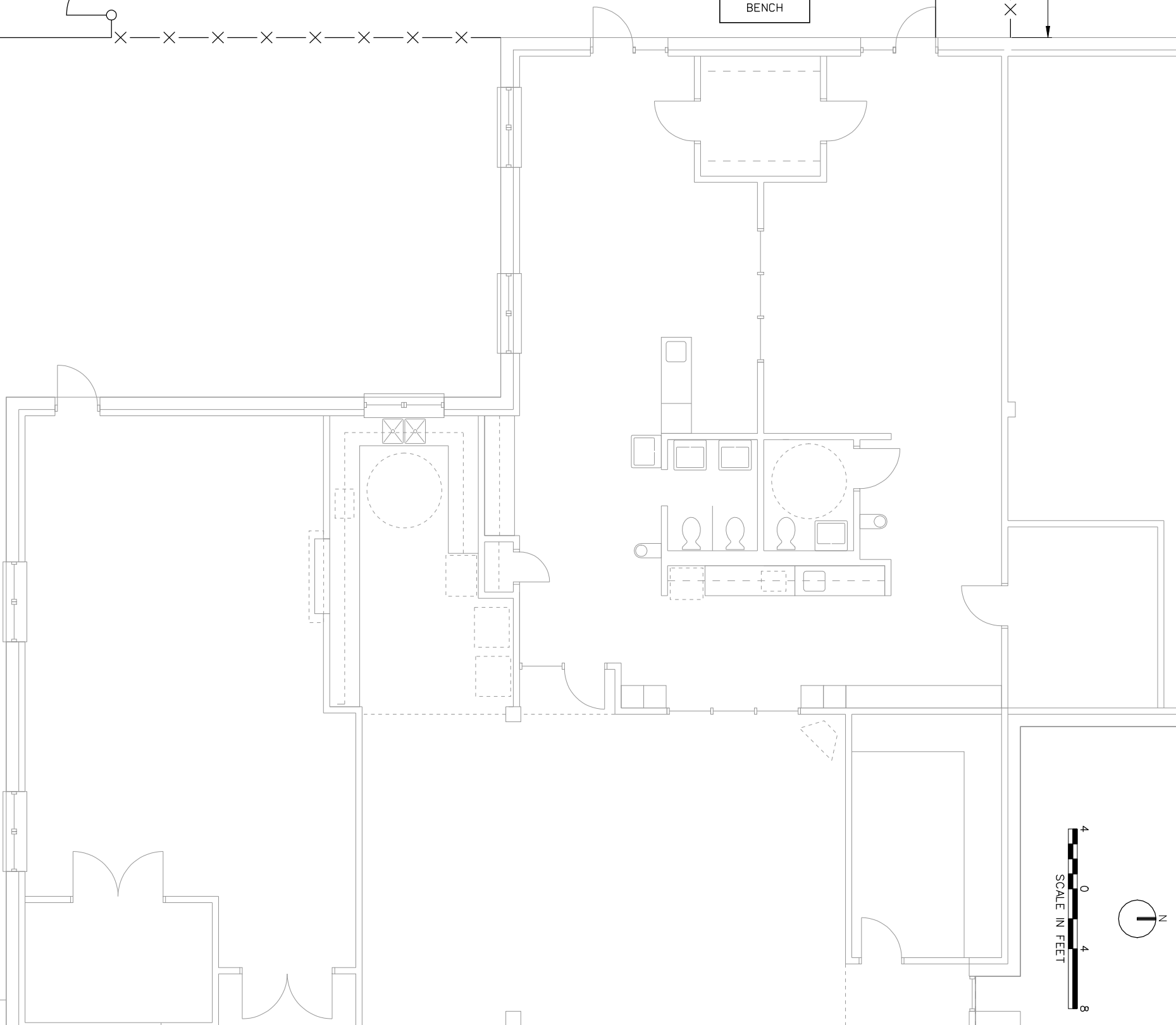
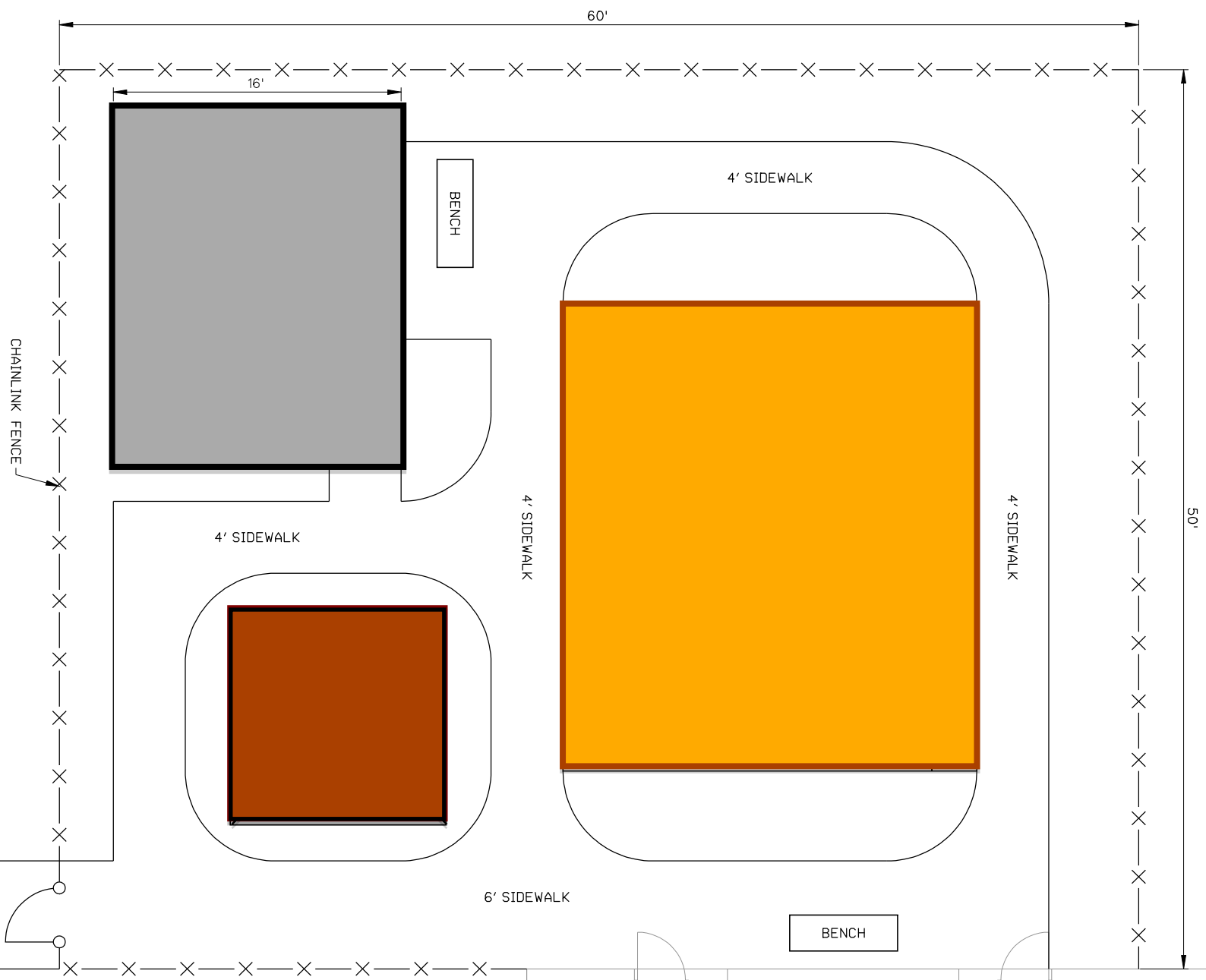
PROCESS PLAN
6-16-10
NOT FOR CONSTRUCTION

Sheet Reference Number: of xxx	FORT LEONARD WOOD, MISSOURI PN 11543, FY 2010 WT COMPLEX BARRACKS AND SITE PACKAGE C PLANTING PLAN	U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS FORT LEONARD WOOD, MISSOURI 700 MEADOW LANE N. 505 - 14TH STREET, SUITE 1000 MINNEAPOLIS, MN 55422 OAKLAND, CA 94612	Designed by: KH Drawn by: Checked by: Submitted by:	Date: 6/14/10 File no. Plot scale: CADD File Name:	<table border="1"> <tr> <th>Symbol</th> <th>Description</th> <th>Date</th> <th>Appr</th> </tr> <tr> <td></td> <td>SUBMITTAL - PACKAGE C</td> <td>xx/xx/10</td> <td></td> </tr> </table>	Symbol	Description	Date	Appr		SUBMITTAL - PACKAGE C	xx/xx/10		 U.S. Army Corps of Engineers Kansas City District
	Symbol	Description	Date	Appr										
	SUBMITTAL - PACKAGE C	xx/xx/10												



US Army Corps
of Engineers
Fort Worth District

[illegible]



Sheet reference number: C102	CENTER OF STANDARDIZATION WARRIORS IN TRANSITION COMPLEX FY08	U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS	Designed by:	Date: JANUARY 2008	Rev.	
	OUTDOOR ACTIVITY AREA (SOLDIER FAMILY ASSISTANCE CENTER)	ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH	Dwn by:	Sol No.		
			Reviewed by:	Contr No.		
			Submitted by:	File name:		
				Plot date: 1/22/2008 Plot scale:		

Symbol	Description	Tracking No.	Action	Date

Contr No.

DESIGN FILE: WT-C102.dgn

Friday, June 25, 2010

APPENDIX K
Utility Cost Information

The following utility rates for this installation are provided for the purpose of performing life cycle cost calculations in response to this solicitation and for design development in accordance with Section 01 33 16 Design After Award:

Utility "A" Rate		
Electric	0.0574	per kwh
LP Gas	1.8405	per gal
Water	0.9618	per Kgal
Sewer	1.1516	per Kgal
Trash	4.1929	per CuYd
Fuel Oil	2.8688	per gal
Natural Gas	12.4418	per mmbtu (Dth)

APPENDIX L**REV 2.0 - 30 NOV 2008****LEED Project Credit Guidance**

This spreadsheet indicates Army required credits, Army recommendations regarding preference and avoidance of individual credits, project-specific ranking of individual point preferences, discussion of Installation roles in support of individual credits, and issues that Government Project Delivery Teams (PDTs) need to be aware of relating to individual credits. The Resources section that follows provides references and resources that relate to LEED, including policy and legal requirements, design guides and documentation resources.

LEED 2.2 Credit Paragraph	LEED Project Credit Guidance	Army Guidance: Required - Preferred - Avoid	Project Preference Ranking: (1=most preferred, blank=no preference, X=preference not applicable to this credit, Rqd=required)	
PAR	FEATURE			REMARKS
CATEGORY 1 - SUSTAINABLE SITES (14 POSSIBLE POINTS)				
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Related to compliance with 40 CFR 122.26 (Clean Water Act).

SS1	Site Selection		X	See paragraph LEED CREDITS COORDINATION for information relating to this credit.
SS2	Development Density & Community Connectivity - OPTION 1 DENSITY		X	Credit is determined by Installation's site selection. See paragraph LEED CREDITS COORDINATION for information relating to this credit.
	Development Density & Community Connectivity - OPTION 2 CONNECTIVITY		X	Credit is determined by Installation's site selection. See paragraph LEED CREDITS COORDINATION for information relating to this credit.
SS3	Brownfield Redevelopment		X	Credit is determined by Installation's site selection. See paragraph LEED CREDITS COORDINATION for information relating to this credit.
SS4.1	Alternative Transportation: Public Transportation Access		X	Credit is determined by Installation's site selection. See paragraph LEED CREDITS COORDINATION for information relating to this credit.
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	Pref		
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 1			Requires provision of vehicles, which cannot be purchased with construction funds. Assume Government will not provide vehicles unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 2	Pref		
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 3			Requires provision of vehicle refueling stations. Installation must support type of fuel and commit to maintaining/supporting refueling stations.
SS4.4	Alternative Transportation: Parking Capacity	Pref		
SS5.1	Site Development: Protect or Restore Habitat			

SS5.2	Site Development: Maximize Open Space	Pref		Assume AGMBC option for aggregated open space at another location on the installation is not available to the project unless indicated otherwise.
SS6.1	Stormwater Design: Quantity Control	Pref		Related to compliance with 40 CFR 122.26 (Clean Water Act).
SS6.2	Stormwater Design: Quality Control			
SS7.1	Heat Island Effect: Non-Roof	Pref		
SS7.2	Heat Island Effect: Roof	Pref	1	Coordinate with nearby airfield requirements, which may preclude this credit.
SS8	Light Pollution Reduction	Pref		
CATEGORY 2 – WATER EFFICIENCY (5 POSSIBLE POINTS)				
WE1.1	Water Efficient Landscaping: Reduce by 50%	Pref		Project must include landscaping to be eligible for this credit.
WE1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	Pref		Project must include landscaping to be eligible for this credit.
WE2	Innovative Wastewater Technologies - OPTION 1			
WE2	Innovative Wastewater Technologies - OPTION 2			
WE3.1	Water Use Reduction: 20% Reduction	Pref		Related to Army mandate for waterless urinals beginning FY10.
WE3.2	Water Use Reduction: 30% Reduction	Pref		
CATEGORY 3 – ENERGY AND ATMOSPHERE (17 POSSIBLE POINTS)				
EAPR1	Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR2	Minimum Energy Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR3	Fundamental Refrigerant Management (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.

EA1	Optimize Energy Performance	Rqd	Rqd	Earning of LEED EA1 points as indicated in paragraph ENERGY CONSERVATION, as a minimum, is required. Note that LEED points calculation is based on energy cost reduction.
EA2.1	On-Site Renewable Energy			
EA3	Enhanced Commissioning			The Commissioning Authority may be provided through the Design-Build Contractor only if in accordance with USGBC Credit Interpretation Ruling (CIR) dated 9/15/06. Commissioning Authority activities begin during design phase and continue well beyond beneficial occupancy. Assume Government will not provide CxA post-occupancy activities unless indicated otherwise.
EA4	Enhanced Refrigerant Management			
EA5	Measurement & Verification			Credit relates to EPACT metering requirements. Provider and funding of post-occupancy activities must be coordinated. Assume Government will not provide post-occupancy activities unless indicated otherwise.
EA6	Green Power		X	Credit is determined by Installation's purchase of green power. See paragraph LEED CREDITS COORDINATION for information relating to this credit.
CATEGORY 4 – MATERIALS AND RESOURCES (13 POSSIBLE POINTS)				
MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Installation provides collection service and outside receptacle needs coordination.
MR1.1	Building Reuse: Maintain 75% of Existing Walls, Floors & Roof			
MR1.2	Building Reuse: Maintain 95% of Existing Walls, Floors & Roof			
MR1.3	Building Reuse: Maintain 50% of Interior Non-Structural Elements			
MR2.1	Construction Waste Management: Divert 50% From Disposal	Pref	1	See paragraph CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT for project requirement.

MR2.2	Construction Waste Management: Divert 75% From Disposal	Pref		
MR3.1	Materials Reuse: 5%			
MR3.2	Materials Reuse: 10%			
MR4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Pref		Relates directly to EPA CPG compliance. Federal regulation as well as Federal, DOD and Army policies require purchase of products that contribute to this credit.
MR4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Pref		Relates directly to EPA CPG compliance.
MR5.1	Regional Materials:10% Extracted, Processed & Manufactured Regionally			
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally			
MR6	Rapidly Renewable Materials			Relates directly to USDA FB4P biobased materials compliance.
MR7	Certified Wood	AVD	AVD	
CATEGORY 5 – INDOOR ENVIRONMENTAL QUALITY (15 POSSIBLE POINTS)				
EQPR1	Minimum IAQ Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Related to compliance with 10 CFR 434 (Federal Energy Code).
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Assume all buildings are smoke free unless indicated otherwise. Family housing, barracks and other lodging are facility types where smoking may be permitted in some cases. If Statement of Work indicates smoking is permitted in these types of facilities, the requirements of LEED-NC 2.2 Option 3 apply.
EQ1	Outdoor Air Delivery Monitoring			

EQ2	Increased Ventilation			May adversely effect ability to earn energy optimization credits.
EQ3.1	Construction IAQ Management Plan: During Construction	Pref		
EQ3.2	Construction IAQ Management Plan: Before Occupancy	Pref		Construction schedule must accommodate activities required for this credit.
EQ4.1	Low Emitting Materials: Adhesives & Sealants	Pref		
EQ4.2	Low Emitting Materials: Paints & Coatings	Pref		
EQ4.3	Low Emitting Materials: Carpet Systems	Pref		
EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	Pref		
EQ5	Indoor Chemical & Pollutant Source Control	Pref		System requiring weekly cleaning to earn this credit is not a permitted option for Army projects.
EQ6.1	Controllability of Systems: Lighting			
EQ6.2	Controllability of Systems: Thermal Comfort			
EQ7.1	Thermal Comfort: Design			
EQ7.2	Thermal Comfort: Verification			Project must earn credit EQ7.1 to be eligible for this credit. Assume Government will not provide post-occupancy activities unless indicated otherwise.
EQ8.1	Daylight & Views: Daylight 75% of Spaces	Pref	1	
EQ8.2	Daylight & Views: Views for 90% of Spaces	Pref		
CATEGORY 6 – FACILITY DELIVERY PROCESS (5 POSSIBLE POINTS)				
IDc1.1	Innovation in Design			
IDc1.2	Innovation in Design			
IDc1.3	Innovation in Design			
IDc1.4	Innovation in Design			
IDc2	LEED Accredited Professional	Rqd	Rqd	LEED AP during design and construction is required.

Resources. Following are resources with web links, discussion of Federal and Army mandates and policies that relate to LEED, sources of design guidance and documentation tools to assist the PDT. Use of/compliance with documents indicated in this appendix is not required unless indicated in RFP. In the event of conflict between RFP and this appendix, RFP takes precedence.

Federal Mandates

EPA, *Environmentally Preferable Purchasing (EPP) Program* (EPA), available through URL: <http://www.epa.gov/oppt/epp/>. Resulting from Executive Order [EO] 13101 *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition* (White House, 14 September 1998), it establishes basic guidelines for EPP as well as forms the basis for Comprehensive Procurement Guidelines (see below).

Comprehensive Procurement Guidelines [CPG], www.epa.gov/cpg.

The EPA publishes the Comprehensive Procurement Guidelines (CPGs), found in 40 CFR 247, that provide a list of products that must contain recovered material. **This is required regardless of whether the LEED recycled content credit is pursued or not.** Recommendations for the percentages of recovered materials are published in a companion document titled the Recovered Materials Advisory Notice (RMAN). Additional products are added every 2-3 years. The CPGs currently include several commonly used construction products (such as concrete, floor tiles, and roofing materials) and landscaping products (such as site furnishings and landscaping timbers).

EPA requires that the purchase of products listed on the CPG contain at least the recycled content indicated in the CPG when practicable. For every project, designer must review the current CPG list and, unless designer determines that justification for non-use exists, ensure that the technical specifications require at least the recycled content indicated in the CPG. The following are considered adequate justifications for non-use:

- a. The product does not meet appropriate performance standards.
- b. The product is not available within a reasonable time frame.
- c. The product is not available competitively (from two or more sources).
- d. The product is only available at an unreasonable price (compared with a comparable non-recycled content product).

Applicable FAR provisions and clauses: FAR Part 23.4, *Use of Recovered Materials*, 52.223-4, *Recovered Material Certification*, 52.223-9, *Estimate of Percentage of Recovered Material Content for EPA-Designated Products*. Note that although EPA designated recycled content products contribute to the LEED recycled content credit, satisfying this requirement does not guarantee that the project will reach the cumulative total required to earn the LEED credit.

USDA Federal Biobased Products Preferred Procurement Program (FB4P)

<http://www.biobased.oce.usda.gov>

The USDA has a program similar to the EPA CPG, found in 7 CFR 2902, that provides a list of designated products that must contain bio-based material with recommendations for the percentages of bio-based content. The rules for use of designated products are the same as EPA CPG. Currently the only designated construction product is roof coatings, however additional products may be added. For every project, designer must review the current USDA designations for products applicable to the project and, if any are found, unless designer determines that justification for non-use exists, ensure that the technical specifications require at least the bio-based content indicated in the designation.

All Federal contracts that involve the use or purchase of USDA- designated products must specify that the associated procurement requirements be met and must include applicable FAR provisions and clauses (currently not yet published). Note that although USDA designated bio-based content products contribute to the LEED rapidly renewable materials credit, satisfying this requirement does not guarantee that the project will reach the cumulative total required to earn the LEED credit.

Army Policy and Mandates

ECB 2006-7R Army Standard for Urinals (09 AUG2006) www.hnd.usace.army.mil/techinfo "Publications", "Engineering and Construction Bulletins". Mandates waterless urinals beginning FY10.

United States Green Building Council/LEED

USGBC Website – <http://www.usgbc.org>

LEED-NC (New Construction) v.2.2 Rating System, October 2005 --
<https://www.usgbc.org/ShowFile.aspx?DocumentID=1095>

LEED-NC v.2.2 Registered Project Checklist --
https://www.usgbc.org/FileHandling/show_general_file.asp?DocumentID=1096

LEED-NC v.2.2 Reference Guide – Available by purchase from the USGBC at:
<http://www.usgbc.org/b2c/b2c/mainFS.jsp>

LEED Letter Templates – Use of LEED Letter Templates for projects not registered with USGBC is a copyright infringement and is not permitted. Samples of the templates are available for review only at: <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1447>. (Fully functional access to LEED On-Line is only available to projects registered with the USGBC.)

LEED Credit Interpretations (CIRs) – Available on the members only side of the USGBC website. Click 'My Account' from the USGBC main web page (log-in and look for CIRs under 'My Resources.'

LEED Application Guide for Multiple Buildings and On-Campus Building Projects
https://www.usgbc.org/FileHandling/show_general_file.asp?DocumentID=1097. Provides direction in applying LEED-NC v2.1 and v2.2 to projects in a campus or multi-building setting such as corporate campuses, college campuses, and government installations (i.e. there is one owner or common property management and control).

General Resources

Unified Facilities Guide Specifications (UFGS) www.wbdg.org/ccb

UFGS are non-proprietary guide specifications covering a broad range of products and systems and incorporating agency-specific guidance and many sustainability updates. They are used and maintained by USACE, NAVFAC, AFCEA and NASA.

UFGS are in the process of being updated to include Specifier notes relating to all current EPA CPG product designations, but this process is not complete yet. Designer MUST address EPA CPG requirements in specifications on a product-by-product basis.

UFGS 01 33 29 *LEED™ Documentation*. This section includes overview and documentation requirements plus credit-specific requirements.

UFGS 01 62 35 *Recycled/Recovered Materials*. This section addresses EPA CPG compliance requirements.

UFGS 02 42 00 *Construction and Demolition Waste Management*. For DB and DBB use. This section includes requirement for waste management plan, diversion requirements and reporting.

UFGS 23 08 00.00 10 *Commissioning of HVAC Systems*. This section includes qualifications, standards and documentation, also includes several test checklists. Because it is limited to HVAC only it **does not** by itself satisfy the LEED fundamental commissioning requirement. Commissioning of other LEED required systems and coordination of documentation associated with this additional commissioning must be addressed.

USACE LEED Credit Documentation Tools

LEED 2.2 Documentation Requirements and Submittals Checklist. USACE Spreadsheet is available at <http://en.sas.usace.army.mil> to fill in for project submittals.

Commissioning Plan Document for LEED Fundamental Commissioning USACE template available at <http://en.sas.usace.army.mil> to edit to create project-specific document.

Owners Project Requirements Document for LEED Fundamental Commissioning. USACE template available at <http://en.sas.usace.army.mil> for Design Agent/Owner to edit to create project-specific document. Completed document should be included in DB RFPs or provided to Design Team at start of design.

Basis of Design Document for LEED Fundamental Commissioning. USACE template available at <http://en.sas.usace.army.mil> for Designer of Record to edit to create project-specific document.

01 FEB 07

Owner's Project Requirements Document for LEED Fundamental Commissioning

Project: _____

Approved: _____

_____	_____	_____
Name	Owner's Representative	Date
_____	_____	_____
Name	Design Agent's Representative	Date

Overview and Instructions

The purpose of this document is to provide clear and concise documentation of the Owner's goals, expectations and requirements for commissioned systems, and shall be utilized throughout the project delivery and commissioning process to provide an informed baseline and focus for design development and for validating systems' energy and environmental performance.

The Owner's Project Requirements Document is a required document for LEED Version 2.2 EA Prerequisite 1, Fundamental Commissioning of the Building Energy Systems. It shall be completed by the Corps District/Design Agent based on coordination with the Installation/User/Proponent and shall be approved by the Installation/User/Proponent representative.

Use of this template is not required, nor are there any restrictions on editing of it. It is provided simply as a tool to assist project teams in meeting the documentation requirements for LEED Fundamental Commissioning.

The intent of the Owner's Project Requirements Document, per the LEED v2.2 Reference Guide, is to detail the functional requirements of a project and the expectations of the building's use and operation as it relates to commissioned systems. This template contains the basic recommended components indicated in the LEED v2.2 Reference Guide. It should be adapted as needed to suit the project, remaining reflective of the LEED intent.

The Owner's Project Requirements Document should ideally be completed before the start of design and furnished to the design team. It must be completed prior to the approval of Contractor submittals of any commissioned equipment or systems to meet LEED requirements.

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Updates to the Owner's Project Requirements Document throughout the course of project delivery shall be made by the Corps District/Design Agent based on decisions and agreements coordinated with and agreed to by the Installation/User/Proponent.

The Owner's Project Requirements Document shall be included in the project's LEED documentation file under EA PR1, Fundamental Commissioning of the Building Energy Systems.

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Owner's Project Requirements Document for LEED Fundamental Commissioning

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 - Occupant Training and Orientation
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TABLE 1

1. **Owner and User Requirements**

What is the primary purpose, program and use of this project? (example: office building with data center)

Describe pertinent project history. (example: standard design development)

Broad Goals

What are the broad goals relative to program needs?

What are the broad goals relative to future expansion?

What are the broad goals relative to flexibility?

What are the broad goals relative to quality of materials?

What are the broad goals relative to construction costs?

What are the broad goals relative to operational costs?

What are the broad goals relative to life cycle of the equipment?

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Other broad goals: *(Insert as applicable)*

2. Environmental and Sustainability Goals

What are the project goals relative to sustainability and environmental issues? (example: LEED Silver rating)

What are the project goals relative to energy efficiency? (example: Meet EPACT)

What are the project goals and requirements for building siting that will impact energy use?

What are the project goals and requirements for building facade that will impact energy use?

What are the project goals and requirements for building fenestration that will impact energy use?

What are the project goals and requirements for building envelope that will impact energy use?

What are the project goals and requirements for building roof that will impact energy use?

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Other: *(Insert as applicable)*

3. Indoor Environmental Quality Requirements

What is the intended use for all spaces? For all spaces that have an intended use that is not readily apparent from the space name, provide this information in Table 1.

What is the anticipated occupancy schedule (numbers of occupants and time frames) for all occupied spaces? Indicate the default occupancy schedule below and for all spaces that have an occupancy schedule that differs from the default, provide this information in Table 1.

What accommodations for after-hours use are required? (example: access control, lighting controls, HVAC controls) Indicate general accommodations required below and for all spaces that have special requirements, provide this information in Table 1.

What are the lighting, temperature, humidity, air quality, ventilation and filtration requirements for all spaces? Indicate the default requirements below and for all spaces that have a requirement that differs from the default, provide this information in Table 1.

Lighting: _____

Temperature: _____

Humidity: _____

Air Quality: _____

Ventilation: _____

Filtration: _____

What are the acoustical requirements for all spaces? Indicate the default acoustical requirements below and for all spaces that have a requirement that differs from the default, provide this information in Table 1.

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What is the desired level of occupant ability to adjust systems controls? Indicate the default desired levels below and for all spaces that have a desired level that differs from the default, provide this information in Table 1.

Lighting: _____

Temperature: _____

Humidity: _____

Air Quality: _____

Ventilation: _____

What, if any, specific types of lighting are desired? (example: fluorescent in 2x2 grid, accent lighting, particular lamps)

4. Equipment and System Expectations

(Complete for each category as applicable or indicate "none identified" or "N/A". Add desired features information for other anticipated commissioned systems as applicable)

Indicate desired features for the following commissioned system: Space Heating

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Ventilation

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

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Flexibility: _____
Maintenance Requirements: _____
Efficiency Target: _____
Desired Technologies: _____

Indicate desired features for the following commissioned system: Air Conditioning

Desired Type: _____
Quality: _____
Preferred Manufacturer: _____
Reliability: _____
Automation: _____
Flexibility: _____
Maintenance Requirements: _____
Efficiency Target: _____
Desired Technologies: _____

Indicate desired features for the following commissioned system: Refrigeration

Desired Type: _____
Quality: _____
Preferred Manufacturer: _____
Reliability: _____
Automation: _____
Flexibility: _____
Maintenance Requirements: _____
Efficiency Target: _____
Desired Technologies: _____

Indicate desired features for the following commissioned system: HVAC Controls

Desired Type: _____
Quality: _____
Preferred Manufacturer: _____
Reliability: _____
Automation: _____
Flexibility: _____
Maintenance Requirements: _____
Efficiency Target: _____
Desired Technologies: _____

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Indicate desired features for the following commissioned system: Domestic Hot Water

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Lighting Controls

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Daylighting Controls

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Emergency Power

Desired Type: _____

Quality: _____

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Preferred Manufacturer: _____
Reliability: _____
Automation: _____
Flexibility: _____
Maintenance Requirements: _____
Efficiency Target: _____
Desired Technologies: _____

Indicate desired features for the following commissioned system: Other - _____

Desired Type: _____
Quality: _____
Preferred Manufacturer: _____
Reliability: _____
Automation: _____
Flexibility: _____
Maintenance Requirements: _____
Efficiency Target: _____
Desired Technologies: _____

5. Building Occupant and O&M Personnel Requirements

How will the facility be operated? Who will operate the facility?

Will the facility be connected to an EMCS? If so, what are the interface requirements? (example: monitoring points, control points, scheduling)

What is the desired level of training and orientation for building occupants to understand and use the building systems?

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What is the desired level of training and orientation for O&M staff to understand and maintain the building systems?

Table 1

Space	Use / Activity	Num of Occs	Special Occupancy Schedule	After Hours Use Reqmt.	Special Cooling Reqmt.	Special Heating Reqmt.	Special Humidity Reqmt.	Special Ventil./Filtration Reqmt.	Special Acoustic Reqmt.	Special Lighting Reqmt.	Special Occup Adjustability Reqmt.



LEED-NC

Build green. Everyone profits.TM

LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects (AGMBC)

**For use with the LEED-NC Green
Building Rating System
Versions 2.1 and 2.2**

October 2005

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Introduction

The purpose of this Application Guide is to provide direction in applying the Leadership in Energy and Environmental Design® Green Building Rating System Versions 2.1 and 2.2 for New Construction and Major Renovations (LEED-NC) to projects in a campus or multi-building setting such as corporate campuses, college campuses, and government installations (i.e. there is one owner or common property management and control). The application guide is intended for projects where several buildings are constructed at once, in phases, or a single building is constructed in a setting of existing buildings with common ownership or planning with the ability to share amenities or common design features. Throughout this guide, the term “campus” is used to represent all of these permutations.

LEED-NC Rating System, Support Materials and Tools

LEED is a program of the U.S. Green Building Council (USGBC) that establishes performance goals in five environmental categories: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, and Indoor Environmental Quality. In addition, a sixth category, Innovation & Design Process, addresses those environmental issues not included in the environmental categories such as acoustics, community enhancement, education, and expertise in sustainable design. Many issues specific to campus projects that are not addressed by the existing credit structure may be included in the Innovation & Design Process category.

The rating system is supported by the LEED-NC Reference Guide, a document that provides additional information and guidance for each LEED Prerequisite and Credit. Consult the LEED-NC Rating System, Reference Guide and www.usgbc.org for more information on the LEED program, the LEED application process, and the USGBC.

Working in concert with the rating system and reference guide, the LEED-NC Submittal Template is a helpful tracking and documentation tool, as well as a required submittal for LEED certification. The Version 2.0 Calculator spreadsheets still remain helpful for some credits.

LEED-NC Application Guide for Multiple Buildings and On-Campus Projects

This Application Guide facilitates using LEED-NC as a performance standard for greening the design of a building or set of buildings within a campus setting (college, corporate, military, multi-use development, etc.), or a group of buildings certifying as a set. A project involving several buildings may be built all at once, or in phases. The latter is especially applicable to large developments.

The Application Guide provides an opportunity for building owners to reduce the environmental impact of buildings by approaching green building in a broader context. Opportunities for reducing environmental impact may be spread over several buildings, a complex of buildings, or an entire campus or installation. Credits are available to each building that benefits from the shared amenities. This approach allows for economies of

scale, enabling more opportunities to reduce the environmental impact of buildings and infrastructure.

The Application Guide analyzes the intent of each LEED-NC credit and prerequisite as developed for commercial facilities and interprets them for campus and installation projects. The greatest opportunities for new interpretations arise in credits associated with Sustainable Sites, Water Efficiency, and Energy and Atmosphere. Materials and Resources and Indoor Environmental Quality credits have fewer campus-specific interpretations and remain mostly the same as LEED-NC, merely requiring aggregation of performance results. The total points available under this guide are the same as LEED-NC v2.1 and 2.2 with no new credits added to or deleted from the basic rating system.

This application guide interprets and supplements the LEED criteria for projects. Where appropriate and unique to the campus or multiple building environment, alternative campus requirements and submittals that meet the intent of the basic rating system are provided. The LEED-NC Rating System and the Reference Guide are the governing documents for all LEED certification applications.

The LEED Multiple Buildings and Campus Committee

The LEED Steering Committee instructed the Multiple Buildings and Campus Committee to create an application guide that would be a simple overlay onto LEED-NC. Although simple in concept, this guide will assist many LEED projects – e.g. at the time of release, approximately 7% of all LEED registered project square footage is that of higher education facilities, which is just one of the sectors served by the guide. The MB&C Committee's ultimate desire is a LEED rating system that can be used to certify entire campuses and military installations in order to more thoroughly impact these market sectors.

USGBC gratefully acknowledges the following committee members (past and present) for their contributions to this document.

Don Fournier (Chair)	University of Illinois Building Research Council
Mark Maves (Vice Chair)	SmithGroup, Inc
Mike Chapman	Naval Facilities Engineering Command
Julia Chlarson	Centers for Disease Control and Prevention
Amanda Eichel	formerly of the University of California
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Merritt Mike	formerly of Southface Energy Institute
Jules Paulk	formerly of Southface Energy Institute
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Richard Schneider	U. S. Army Engineering Research & Development Center
Melissa Solberg	formerly of Ford Land Development Corporation
Joel Stout	University of Cincinnati, Division of the University Architect

Overview

How to Use the Application Guide

This Application Guide is designed to complement the LEED-NC Green Building Rating System and the LEED-NC Reference Guide. The prerequisites and credits are supplemented, where necessary, by alternative Requirements and Submittals in order to apply the rating system to on-campus projects and multiple-build projects. *Credit requirement alternatives in this Application Guide may be used instead of the regular LEED-NC requirements, but are not mandatory as they may not apply in all situations.* The USGBC's CIR process also applies to this Application Guide and its requirements.

If appropriate, each prerequisite or credit includes Application Guidance with a discussion of related technologies and strategies. The Application Guide should be used as a working document that is referenced frequently throughout the design process.

Campus and Multiple Building Issues

The most detailed application guidance is necessary in the Sites category, as it presents the most challenges. Most credits in other categories simply allow the option of aggregate calculations. Campus settings sometimes have established property lines between segments of the campus, but share a common infrastructure between areas. Street lighting within a campus (e.g., lighted walkways) may technically encroach upon an adjacent property within the campus boundary. Similarly, stormwater from the campus may enter into a common retention pond or treatment facility specifically built for the campus. The use of natural treatment processes and distributed approaches are encouraged in the campus setting. The campus may own a wastewater treatment system and utilize the gray water for irrigation purposes. Streets and right of ways may be turned over to the local government after completion. Infrastructure and common amenities can be shared in campus settings and may contribute to performance achievement, thus helping to capture LEED points. The approach must be consistently applied across the project and all such cases are carefully scrutinized by the USGBC.

Some campus and multiple building projects may be mixed use development where the campus is developing a portion of the project and a separate party (or parties) is developing the remainder of the project. In such cases, the campus entity may define the LEED scope in such a way as to omit buildings that will be built by a separate party. This choice should be made with due consideration of the issues and projects are advised to keep omissions within the site boundaries to reasonable limits, in particular to parts of the overall project over which the project team will not have control. When the project is one building, the parts of the building within the campus entity's scope must meet LEED requirements. It is recommended that these buildings demonstrate that specific steps have been taken and guidance provided to insure that future build-out can also meet LEED requirements. The development of a thorough and instructive set of design guidelines and recommendations, coupled with building infrastructure to

support future LEED build-outs, is encouraged to ensure that the building will perform as a LEED building after build-out.

The Certification Process for Multiple Buildings and within Campus Settings

Any project team utilizing this guide simply registers its project under the standard LEED-NC program. A project already registered can choose to use the application guide at any time before certification submittal, but should do so as early as possible during the pre-design or design stage.

*** **Note:** The following certification processes are in pilot phase, and may be revised at any time. The most up-to-date version will be posted on the Web site along with this application guide. ***

There are three approaches to certifying buildings in the campus or installation setting:

- Certifying a new building within a setting of existing buildings that are considered a campus, i.e. there is one owner or common property management and control.
- Certifying a group of new buildings as a package where the entire building set will be rated as a package and only one rating received. These buildings may constitute the entire campus or be a subset of an existing campus.
- Certifying new buildings where each new building is constructed to a set of standards but will receive an independent rating based on achievement of credits beyond the standards specific to that building. These buildings may constitute the entire campus or be a subset of an existing campus.

Each of these approaches will be discussed separately and registration and certification provided for that particular approach.

Certifying a new building within a setting of existing buildings

The certification process is essentially the same as the LEED-NC certification process for the given building. When certifying a single building under the Application Guide, you may choose campus requirements and submittals in lieu of the standard LEED-NC requirements and submittals where unique aspects of the campus setting have an impact on the credit affecting the building, e.g. where stormwater management practices are campus-wide rather than building-specific.

A reasonable and logical “LEED project site” boundary must be defined for LEED purposes. The project scope of work and the site area affected by the construction generally suffice to inform this definition. The defined site must remain consistent for all LEED credits. The Application Guide provides details on special considerations for shared amenities such as parking (adjacent and, more often, remote) and open space.

Certifying a group of new buildings as a package where the entire building set will be rated as a package and only one rating received

For entities that construct a set of buildings at once or over a defined time period in a campus setting, certification of each building individually could result in excessive documentation, much of which would be duplicated between buildings. In this case the option of rating the entire building set may be the best choice. When certifying a set of buildings under the Application Guide, you may choose campus requirements and submittals in lieu of the standard LEED-NC requirements and submittals where unique aspects of the campus setting impact the credit affecting the buildings. The Application Guide provides the methods for calculations and submittals for credits that may be averaged across the set of buildings and defines which credits must be met by each individual building. Using the averaging techniques, where applicable, allows for one rating to be applied to the building set, thereby minimizing documentation. Identify the group of buildings with a single name for LEED registration and certification.

Certifying new buildings where each new building is constructed to a set of standards but will receive an independent rating based on achievement of credits beyond the standards

1. Many campus build entities establish design standards (e.g. campus master plans and specifications) that will be applied repeatedly to new buildings. These elements may be site- or building-specific. The campus build process allows applicants to certify a “prototype” credit set that is intended for repetition on subsequent projects. The total credits beyond the standards may vary from building to building. Project teams will be permitted to designate prerequisites as prototypes.

2. Certification Review for the First Project:

- a. USGBC shall conduct a thorough and complete review of the first project, including prototype credits.
- b. The certification submittal shall include all supporting background information for prototype prerequisites/credits, and specific guidance will be developed for these requirements (similar to that created for LEED-NC audits).
- c. Projects will receive a Preliminary and Final LEED Review for all prerequisites/credits pursued, following the published review process.
- d. The Appeal process shall be an option for any prerequisite/credit which is part of this first project.

- e. All approved prototype prerequisites/credits will be designated as such in the Final or Appeal LEED Review of this first project. Any denied prototype prerequisite/credit shall not be included in the prototype set.

3. Certification Reviews For Subsequent Project(s):

- a. Subsequent projects shall be reviewed per the current process, which includes up to six prerequisites/credits selected for audit. It will be at the discretion of the review team whether or not a prototype credit will be selected as one of the up to six for audit.
- b. These projects will not be required to submit documentation on approved prototype prerequisites/credits unless selected for audit in the Preliminary LEED Review.
- c. Failure of an audited prototype prerequisites or credit will result in that item being denied in the current review. The denied item will temporarily drop out of the set of approved prototype prerequisites/credits as the project team will be required to demonstrate achievement of this specific item for the next three consecutive project application reviews. Once achievement is demonstrated, this item will return to the prototype set. If achievement is NOT demonstrated in any one of the next three consecutive project application reviews, the item shall be permanently removed from the prototype set.
- d. Appeals will not be permitted for prototype prerequisites/credits in subsequent projects.
- e. Prerequisites/credits may be dropped from the approved set of prototype prerequisites/credits at the project team's discretion. Once removed from the set, this item shall not be reviewed as a prototype prerequisite/credit unless it is re-established as such by demonstrating achievement of this specific item for three consecutive project application reviews, or per the steps outlined in #2 above.
- f. Prerequisites/credits may be added to the approved set of prototype prerequisites/credits at the project team's discretion. It must be established as such by demonstrating achievement of this specific item for three consecutive project application reviews or per the steps outlined in #2 above (for the latter, this action shall occur with an individual project application, and a fee will be associated with adding this item to the prototype set).

The process above assumes that all buildings will be constructed to a specific standard and that credits associated with that standard can receive preliminary approval. Within the campus setting, the situation can arise where certain site-related amenities would

not be constructed until after the building project is complete. This may result in some pending credits for buildings. These pending credits cannot be awarded until the actual master plan is put into effect and the shared amenities constructed. The individual projects have two choices:

1. Complete certification of the project with certain credits “pending.” These pending credits may alter the rating of the project. If the project is rated without the pending credits, its rating will be based on only those credits achieved. Once the pending credits are available, the project can be recertified and the credits awarded at that time.
2. Await certification until all credits are available.

The volume/campus build process can also be a useful tool for developers to use when managing a portfolio of buildings. Tracking site-specific issues and benefits of individual credits or strategies and the lessons learned during the process will inform future design revisions and decisions. Whether building and certifying projects one at a time, or as a package of several buildings, project teams must be fair and reasonable in defining the project scope and site boundaries and be consistent across credit calculations.

Summary of Prerequisites and Credits

Sustainable Sites	14 Possible Points
Prerequisite 1: Erosion and Sedimentation Control	Required
Credit 1: Site Selection	1
Credit 2: Urban Redevelopment	1
Credit 3: Brownfield Redevelopment	1
Credit 4: Alternative Transportation	4
Credit 5: Reduced Site Disturbance	2
Credit 6: Stormwater Management	2
Credit 7: Reduced Heat Island Effect	2
Credit 8: Light Pollution Reduction	1
Water Efficiency	5 Possible Points
Credit 1: Water Efficient Landscaping	2
Credit 2: Innovative Wastewater Technologies	1
Credit 3: Water Use Reduction	2
Energy and Atmosphere	17 Possible Points
Prerequisite 1: Fundamental Building Systems Commissioning	Required
Prerequisite 2: Minimum Energy Performance	Required
Prerequisite 3: CFC Reduction in HVAC&R Equipment	Required
Credit 1: Optimize Energy Performance	10
Credit 2: Renewable Energy	3
Credit 3: Additional Commissioning	1
Credit 4: Ozone Protection	1
Credit 5: Measurement and Verification	1
Credit 6: Green Power	1
Materials and Resources	13 Possible Points
Prerequisite: Storage and Collection of Recyclables	Required
Credit 1: Building Reuse	3
Credit 2: Construction Waste Management	2
Credit 3: Resource Reuse	2
Credit 4: Recycled Content	2
Credit 5: Local/Regional Materials	2
Credit 6: Rapidly Renewable Materials	1
Credit 7: Certified Wood	1

Indoor Environmental Quality		15 Possible Points
Prerequisite 1: Minimum IAQ Performance		Required
Prerequisite 2: Environmental Tobacco Smoke (ETS) Control		Required
Credit 1: Carbon Dioxide (CO2) Monitoring		1
Credit 2: Ventilation Efficiency		1
Credit 3: Construction IAQ Management Plan		2
Credit 4: Low-Emitting Materials		4
Credit 5: Indoor Chemical and Pollutant Source Control	I	1
Credit 6: Controllability of Systems		2
Credit 7: Thermal Comfort		2
Credit 8: Daylighting and Views		2
Innovation and Accredited Professional Points		5 Possible Points
Credit 1: Innovations in Design		4
Credit 2: LEED Existing Building Accredited Professional		1
TOTAL POINTS AVAILABLE		69

SUSTAINABLE SITES

SS Prerequisite 1: Erosion & Sedimentation Control

Application Guidance

When the site incorporates more than one building, consider the phasing of construction and how the control plan will be modified over time to achieve the requirements. Site disturbance may also be phased and erosion control techniques applied at appropriate times. For large sites, this may be required by law, so effective planning at this scale is highly recommended.

SS Credit 1: Site Selection

Application Guidance

The requirements of this credit are very specific to the project site; substitution of other parcels to meet these requirements is not allowed. Selection of a site for multiple buildings—especially one that is developed over a long period of time—will require effective site layout and planning to be sure all buildings will be able to meet the requirements.

If the site of a multiple-building development does not fully comply with credit requirements, then the buildings can not achieve the credit under a single group certification. However, in such a situation, an individual building is still eligible for the credit if it can be demonstrated that:

1. the area disturbed by the building's construction activity complies with credit requirements and this is demonstrated within the LEED application submittal. This approach is expected to be most useful when buildings are being constructed at different times; OR
2. credit requirements are met for the area defined by a reasonable "LEED project site boundary" that corresponds to the buildings' development footprints or other fair subdivision method. The LEED application submittal must include thorough justification for this artificial site boundary, as it will be closely scrutinized. The LEED project boundary must remain consistent for all credits. This approach is expected to be most useful when buildings are constructed within the same or overlapping time frames.

SS Credit 2: Development Density & Community Connectivity

Application Guidance

NC Version 2.2 provides a “community connectivity” option that is most likely preferable for most campus and non-urban settings. Version 2.1 guidance reflects interpretations that provide compliance pathways adjusted for campus settings.

For Version 2.2, Option 2 (Community Connectivity):

Single buildings on a campus and each building within multiple building projects must comply with the credit requirements as written in order to achieve the compliance path.

For Version 2.1 (and Version 2.2 Option 1):

Requirements

- a) Show that the project complies with the Version 2.1 credit requirements as written and incorporating the concepts in the “supplemental application guidance” section, below.

OR

- b) If the site is located in an existing urban area and the contiguous property is over 15 acres the project may use the campus boundaries in lieu of a documentation circle to calculate density.

OR

- c) Show that the project complies with a regional or campus master planning effort to redevelop an area with existing infrastructure into a higher density area with an ultimate intended density that reflects desired local development conditions and meets the intent of this credit.

Submittals for (c)

To document that the project has achieved credit equivalence, provide the following information in addition to the Submittal Template:

- Documentation showing that the project is being located in a previously developed area with existing development and infrastructure. (New development in a greenfield would not be considered appropriate in this case.) Provide information about the existing development density based on either the documentation circle or the property boundaries.
- Documentation verifying that the project location is within a designated dense urban or campus growth area.

- Documentation that the project is resulting in increased development density that meets or contributes to the goals of the urban development plan or campus master plan.

Supplementary Application Guidance

Typical programmatic requirements for a campus or installation can include common green spaces, land used for agriculture, and outdoor recreation spaces (except sport stadiums). These will all decrease average density when included in the calculations, yet they provide important functions and quality-of-life to a campus. Therefore, these types of required, programmed, low-density outdoor land uses may be considered added to the list of exceptions on page 21, step 5 of the LEED-NC v2.1 Reference Guide, along with "undeveloped public areas such as parks and water bodies."

Using the campus boundary for density calculations (if the campus is at least 15 acres) is beneficial because it does not penalize existing rural or suburban institutions for their neighbors' lower development density, nor does it benefit urban campuses for their neighbors' higher density. The stipulation of 15 acres was chosen because it generally indicates a sizable campus that is deemed to have a substantial enough impact to serve the credit's intent. Using this method also reduces some of the burden of documentation compared to original requirements. Once it is completed for one campus project it is simply updated for the next one, rather than defining a new boundary circle each time and researching additional buildings within a slightly different radius.

A new building is best located where shared physical and intellectual resources exist. Locating it next to an area with a higher density just to promote density rather than where it rationally belongs is not reasonable and it may create negative impacts for transportation and other community aspects. The credit's intent is well served by encouraging campuses to increase their on-campus density (even if existing density is not quite 60,000sf/acre). This approach might also encourage better master planning of building-to-infrastructure relationships on campus.

The LEED-NC v2.1 Reference Guide (page 20) says "Work with local jurisdictions and follow the urban development plan to meet or exceed density goals." Many university campuses and government installations are not required to follow local jurisdictions in this regard and should therefore establish their own density goals that meet the intent of this credit.

SS Credit 3: Brownfield Redevelopment

Application Guidance

Large brownfield site redevelopments may vary in the amount of remediation required for specific buildings under consideration. As long as the entire site is considered a brownfield, credit may be given to buildings on portions of that site that are contaminant free and require no specific remediation for their development footprint.

SS Credit 4.1: Alternative Transportation - Public Transportation Access

Application Guidance

Work with the transit authority to re-engineer bus routes and stops to service the site so that each building is within the required proximity. Consider establishing transit corridors and zones within the campus to ensure availability and access for the entire campus. Either public or campus bus lines must be in place by the end of construction to receive credit on that basis. Campus bus lines must interface with public mass transit. If there is no local mass transit, the campus bus line must connect with a commercial bus or rail line.

For rail transit systems that have not yet been constructed, a letter from the transit authority (stating the intent to establish the rail station and confirming funding sources) is sufficient to qualify for the credit. Campus shuttles to the closest operational station (if local) can be an interim solution until a new, closer station is in full operation.

SS Credit 4.2: Alternative Transportation - Bicycle Storage & Changing Rooms

Application Guidance

The requirements are applicable to each building in a multiple-build project. When calculating the bicycle rack capacity for transients in a non-residential building, address the loading possible at one time and not the cumulative loading based on the total transients in a day. Locate the bicycle storage facilities within 50 feet of the frequently used entrances. Transient (e.g. students, in the case of a campus building) occupancy is required to be included when calculating bicycle storage capacity.

Full-time staff (or staff FTE) may be used to calculate shower/changing room requirements. For this calculation, transients are to be defined as visitors to the building for less than 7 hours. Establish overlapping zones within the campus for ready access to shower and changing facilities.

If the project(s) is a mixed used development including residential buildings and other types of buildings, such as barracks complex on a military installation or a residential section of a campus, each building needs to meet the bicycle storage requirements based on its usage and occupancy.

A project is exempt from the shower facility requirement if all non-transient building occupants are housed on the same campus as that building (i.e. a military installation), or within a ½ mile of the building(s).

SS Credit 4.3: Alternative Transportation - Alternative Fuel, Low Emission and Fuel-Efficient Vehicles

Application Guidance

Requirements

Provide alternative fuel vehicles (ultra low sulfur diesel, CNG, LNG, electric, fuel cell, E85; or use average B50 biodiesel in standard diesel engine), low-emission and/or fuel efficient vehicles* for 3% of the full time employees (FTE) in the building(s) AND provide preferred parking for these vehicles, AND have access to a nearby alternative fueling station.

OR

Where the campus has a central fleet operation or motor pool, at least 50% of the vehicles available must be alternative fuel vehicles (as defined above).

Bi-fuel vehicles must utilize the alternative fuel option.

In the case of centralized parking, accommodations for alternative-fueled vehicles may be made at the central facilities, providing that those accommodations are credited cumulatively to each building's need based on the preceding criteria. The centralized parking must be within ¼ mile of the building(s) or serviced by a campus shuttle.

** Low-emission and fuel-efficient vehicles are defined as vehicles that are either classified as Zero Emission Vehicles (ZEV) by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.*

Submittals

Provide a LEED Submittal Template and (back-up documentation that proves faculty/staff/students/employees/residents own vehicles via the preferred parking incentive program), a map identifying the location(s) of the alternative fueling facility, and for campus/installation fleet vehicles provide proof of ownership of, or 2 year lease agreement for, alternative fuel vehicles and calculations indicating that alternative fuel vehicles will serve 3% of

building occupants. Provide site drawings or parking plan highlighting preferred parking or alternative fuel vehicles.

OR

Provide a LEED Submittal Template with specifications and site drawings highlighting alternative refueling stations. Provide calculations demonstrating that these facilities accommodate 3% or more of the total vehicle parking capacity. If centralized parking is used, provide documentation that the parking meets the requirements for distance or shuttle service.

Supplementary Application Guidance

The campus environment lends itself very well to centralized parking concepts which may more readily accommodate preferred parking. A centralized alternative fueling area may be a viable alternative in the case of flexible fuel vehicles. Fleet purchases and/or fuel choices (e.g. biodiesel) may be strategically combined to achieve the performance target. Consider incentive programs for faculty/staff/students.

SS Credit 4.4: Alternative Transportation - Parking Capacity

Application Guidance

Campuses are often exempt from local zoning laws regarding parking, and thus determine their own standards. Calculation and documentation for this credit may be done either on a project by project basis or a campus-wide basis.

Requirements

If applicable local zoning code indicates there are no minimum parking capacity requirements, or if the campus entity is exempt from local codes, size the parking capacity in transit-oriented developments (TOD's) according to the minimum requirements by building typology as outlined in the Portland, Oregon Title 33 Planning and Zoning -Chapter 33.266 for Parking and Loading, Table 266-1 and 266-2 (at

http://www.planning.ci.portland.or.us/zoning/ZCTest/200/266_parking.pdf) AND provide preferred parking for carpools or van pools capable of serving 5% of the building occupants,

OR

For rehabilitation projects add no new parking and reduce the capacity of existing oversized parking AND provide preferred parking for carpools or vanpools capable of serving 5% of the building occupants.

Accommodations for carpools and vanpools may be made at the central parking facilities, providing that they are credited to only one building or project based on the preceding criteria. The centralized parking should be within ¼ mile of the building(s) served or be serviced by a shuttle bus.

Supplementary Application Guidance

The campus environment lends itself very well to centralized parking concepts which may more readily accommodate preferred parking. An alternative method of establishing parking requirements have been provided. It is suggested that the method that generates the least parking be utilized. Long term master planning of campus parking facilities is recommended. A successful application of demographic analysis of parking facility users will help identify where parking will work best to serve mixed uses. An example is to locate parking garages where they can effectively be used by at least two groups or shifts per day, rather than a garage dedicated to just an 8am-5pm work force

When calculating the carpool space requirement on a campus where no parking is permitted within the specific project boundary, it is permissible to meet this credit by providing carpool spaces outside of the project boundary to serve the 5% of building occupants. These spaces must not be counted toward other LEED projects. Signage restricting carpool parking only to this project's occupants is not necessary. The "preferred" parking requirement is satisfied if a campus shuttle bus route serves satellite parking lots and structures. Calculation and documentation for this credit may also be achieved on a campus-wide basis. When using the campus-wide approach:

- If all parking spaces are permitted and designated as residential and commuter, the number of commuter permits may be used as the basis of calculations for carpool spaces.
- The credit can be achieved by proxy if local jurisdictional requirements that exceed the credit requirements and it is clearly demonstrated in the LEED submittal.
- Comprehensive transportation management programs are eligible for an innovation point.

Regardless of the compliance approach utilized, it is necessary to sufficiently promote the carpool program.

SS Credit 5.1

Version 2.1: Reduced Site Disturbance - Protect or Restore Open Space

Version 2.2: Site Development - Protect or Restore Habitat

Application Guidance

Submittals

- For greenfield sites, provide the LEED Submittal Template and attach a list of buildings indicating that each has met requirements.
- For previously developed sites where there are multiple buildings in the project scope, enter aggregate data in the Submittal Template, as appropriate.

Supplementary Application Guidance

Consider the aspects of construction phasing and the use of future building footprints for staging areas and temporary disturbance locations. On projects that are only a portion of a larger development and artificial site boundaries are defined for the LEED project, be sure that they are reasonable, logical, chosen with all credits in mind, and that their use is consistent through all credits. For multiple buildings, consider aggregating any restored previously degraded parts of the site as larger areas of habitat are more effective.

SS Credit 5.2

Version 2.1: Reduced Site Disturbance - Development Footprint

Version 2.2: Site Development - Maximize Open Space

Application Guidance

Requirements

Open space area can be either adjacent to the building(s) or at another location on the campus. It must be aggregated and contiguous, not divided and dispersed. The open space may be at another campus site as long as it is placed in a permanent reserve status.

Submittals

- If there are multiple buildings in the project scope, enter aggregate data in the Submittal Template.
- For campus areas where the choice is made to have the open space set-aside not adjacent to the buildings provide documentation showing the requirements have been met and the land is in a natural state or been returned to a natural state and conserved for life of the buildings.

Supplementary Application Guidance

Open space does not have to be contiguous to the building(s) to which it is accredited. Open space may be aggregated and set aside as a larger plot of land. The land must be in a natural state or returned to a natural state; quads and playing fields do not count towards attaining this credit. This may enhance ecosystems and provide a larger piece of habitat. Clustering of buildings is good practice in terms of concentrating the impact of development in a limited area, leaving more of the site in its natural state, or providing for larger areas of habitat. Establishment of the project boundary with all credits in mind can enhance this process. Vegetated roofs may also contribute to credit compliance if the plantings meet the definition of native/adapted.

SS Credit 6.1

Version 2.1: Stormwater Management - Rate and Quantity

Version 2.2: Stormwater Design: Quantity Control

Application Guidance

Requirements

The credit requirements may be met using a centralized approach affecting the defined project site and that is within the campus boundaries. Distributed techniques based on a watershed approach are then required.

Submittals

If there are multiple buildings in the project scope, enter aggregate data in the Submittal Template. Demonstrate that centralized stormwater management strategies using distributed technologies achieve credit performance requirements.

Supplementary Application Guidance

A master planning approach to storm water management and overall impervious surface management that is campus-wide or based on the local watershed is preferred over stormwater management planning limited to one project site at a time. The campus setting with larger boundaries and settings allows comprehensive stormwater management techniques to be applied on a larger scale and with more flexibility. This provides economies of scale and affords greater opportunities for clustering buildings, increasing natural settings, and applying distributed management techniques cost effectively. Phasing of projects may affect when a Master Plan is implemented and how the specific building(s) under consideration will be accommodated.

SS Credit 6.2

1 Point

Version 2.1: Stormwater Management – Treatment

Application Guidance

Same as credit 6.1.

SS Credit 7.1: Heat Island Effect - Non-Roof

Application Guidance

Submittals

If there are multiple buildings in the project scope, enter aggregate data in the Submittal Template and list the buildings meeting this credit.

Supplementary Application Guidance

The campus setting with larger boundaries and settings allows comprehensive heat island management techniques to be applied on a larger scale and with more flexibility. This provides economies of scale and affords greater opportunities for clustering buildings, increasing pervious surfaces and natural settings, and applying management techniques cost effectively.

SS Credit 7.2: Heat Island Effect - Roof

Application Guidance

Submittals

If there are multiple buildings in the project scope, enter aggregate data in the Submittal Template and provide a list of buildings meeting the credit.

Supplementary Application Guidance

An average of compliance for building roof areas may be used to meet these requirements when more than one building is on the site. For each building or for the group of buildings, combinations of high albedo and vegetated roof must collectively cover 75% of the roof area.

SS Credit 8: Light Pollution Reduction

Application Guidance

Requirements

Develop an exterior lighting master plan that includes the project site and the surrounding buildings in a comprehensive manner addressing the safety and security issues of the campus environment by sharing exterior lighting amenities while minimizing light pollution and energy consumption. The lighting master plan must show that it incorporates the credit requirements as well as the following:

- How this plan will reduce light trespass and night sky access and specific projects fit into the overall design.
- How safety, security, and comfort will be enhanced by the use of a master plan.

Submittals

- Provide exterior lighting master plan that addresses the project site and buildings and infrastructure showing how overall light pollution is reduced.
- Provide a design narrative from the Architect, Electrical Engineer, or responsible party that demonstrates what measures have been implemented for the registered LEED building(s) to meet the provisions of the exterior lighting master plan in the campus requirements.

WATER EFFICIENCY

WE Credit 1: Water Efficient Landscaping

Application Guidance

Submittals

If there are multiple buildings in the project scope, enter aggregate data in the Submittal Template. Submit appropriate documentation supporting the design of the rainwater collection system, the landscape design, and the extent of the supplemental temporary irrigation system.

Supplementary Application Guidance

Landscaping in the larger context of the campus provides abundant opportunity to implement solutions that require less water and for capturing rainwater or recycled water. Large campuses may consider treating its buildings' wastewater to standards for non-potable uses.

While consistency in site boundaries is required, the initial flexibility in site boundary selection and building clustering options allow for enhanced opportunities for sharing captured or reusable water. The project may also use native plants and other landscape alterations leading to a lower water demand. A temporary irrigation system may be used during establishment period for landscape.

WE Credit 2: Innovative Wastewater Technologies

Application Guidance

Submittals

If there are multiple buildings in the project scope, enter weighted aggregate data in the Submittal Template.

Supplementary Application Guidance

When the site has more than one building, a weighted average of the site buildings, based on square footage, must be used to meet the requirements of the credit. This method ensures that each building generally meets the performance requirements.

Opportunities of scale may also allow more effective use of rain harvesting techniques or innovative and economical waste treatment technologies for the building(s) on the site. Options

include packaged biological nutrient removal systems, constructed wetlands, and high-efficiency filtration systems.

WE Credit 3: Water Use Reduction

Application Guidance

Submittals

If there are multiple buildings in the project scope, enter weighted aggregate data in the Submittal Template.

Supplementary Application Guidance

When the site has more than one building, a weighted average of the site buildings, based on square footage, must be used to meet the requirements of the credit. This method ensures that each building generally meets the performance requirements.

Opportunities of scale may also allow more effective use of certain techniques in differing buildings on the site.

Because of the varying occupant numbers in some types of campus buildings (including students, staff, and visitors) an alternative method of calculating this credit may be used. Rather than basing the calculations on the number of occupants, the water use may be based on the total number of each type of applicable fixtures in the building and the estimated number of uses for each of these. For example, for public water closets a sample calculation is as follows: $\text{Total Daily Water Use (Public WC)} = \text{Total Number Of Fixtures} \times \text{Estimated Daily Uses} \times \text{Flow Rate(GPF)} \times \text{Duration}$

The calculations should use the same fixture count and daily use numbers for the base and proposed case. This provides a reasonable representation of base and proposed case water use. Calculations should include all flush fixtures and the following flow fixtures: public and private lavatories, public and private showers, kitchen faucets, and laboratory and service lavatories.

The following as process loads may be excluded: eyewash fountains, emergency showers, water coolers, and water fountains.

ENERGY & ATMOSPHERE

EA Prerequisite 1

Version 2.1: Fundamental Building Systems Commissioning

Version 2.2: Fundamental Commissioning of the Building Energy Systems

Application Guidance

Requirements

Each building in a project must independently meet the requirements of this prerequisite.

Supplementary Application Guidance

Every building on the project site must document compliance. An employee in the owner's organization, who is not responsible for project design or construction management or supervision of the project and who has the appropriate credentials, would be the preferred commissioning authority for EA Prerequisite 1. The documentation for EA Prerequisite 1 may be from the design firm, but the individual acting as the commissioning authority must not be responsible for project design, construction management, or supervision.

In the campus setting, other elements and site features associated with a building project, such as fountains, irrigation system, wheelchair lifts, 'help phones', and exterior lighting systems which are not actual part of a building should also be considered for the commissioning process.

Many campus organizations have commissioning requirements for all projects such as a Project Delivery Process (PDP) Manual which outlines required commissioning related steps for each project phase, from initial scoping to closeout. It is suggested that these types of documents be reviewed for compliance with the LEED fundamental commissioning requirements and be modified, if necessary, to ensure that the strategies employed by the design team to achieve the fundamental commissioning credit fulfills all requirements set forth by the LEED reference guide. A local document or manual as well as any specifications that reference the manual may be submitted along with documentation of how the local manual and procedures specifically meet or exceed the referenced LEED standard. A local manual may serve as documentation for the development of the commissioning plan as long as the manual also complies with the LEED reference guide. The intent of the fundamental commissioning prerequisite will be met assuming the applicant provides information demonstrating their standard building practices, as outlined in the locally-generated procedures manual, meet or exceed the LEED referenced commissioning requirements.

EA Prerequisite 2: Minimum Energy Performance

Application Guidance

Requirements

Each building in a project must independently meet the requirements of this prerequisite.

Supplementary Application Guidance

When designing a group of buildings, orientation and site utilization can have a major impact on energy consumption. Consider the group of buildings as a whole for the application of passive tempering and alternative energy applications.

EA Prerequisite 3

***Version 2.1:* CFC Reduction in HVAC&R Equipment**

***Version 2.2:* Fundamental Refrigeration Management**

Application Guidance

Requirements

Each building in the project must meet this prerequisite. If the building(s) is connected to a central chilled water system, that system must either be CFC free or a commitment to phasing out CFC-based refrigerants must be in place, with a firm timeline of five years from completion of the project. Prior to phase out, reduce annual leakage of CFC-based refrigerants to 5% or less using EPA Clean Air Act, Title VI, Rule 608 procedures governing refrigerant management and reporting.

An alternative compliance path for buildings connected to a central chilled water system requires a third party (as defined in the LEED-EB Reference Guide) audit showing that system replacement or conversion is not economically feasible. The definition of the required economic analysis is: the replacement of a chiller(s) will be considered to be not economically feasible if the simple payback of the replacement is greater than 10 years. To determine the simple payback, divide the cost of implementing the replacement by the annual cost avoidance for energy that results from the replacement and any difference in maintenance costs including make-up refrigerants. If CFC-based refrigerants are maintained in the central system, reduce annual leakage to 5% or less using EPA Clean Air Act, Title VI, Rule 608 procedures governing refrigerant management and reporting and reduce the total leakage over the remaining life of the unit to less than 30% of its refrigerant charge.

Submittals

Provide a LEED Submittal Template, signed by a licensed professional engineer or architect and an attached list of the buildings declaring that each building's HVAC&R systems do not use CFC-based refrigerants.

OR

Provide a modified LEED Submittal Template, signed by a licensed professional engineer or architect with an attached list of the buildings and a letter of commitment from the campus/installation declaring its intention to phase-out CFCs and a summary of the phase out plan describing actions and approximate time frame. AND demonstrate that until phase out, existing CFC containing equipment meets EPA Title VI, Rule 608, procedures for refrigerant management and reporting.

OR

Provide results of third-party audit demonstrating that replacement is not economically feasible based a 10-year simple pay-back analysis. AND provide documentation showing compliance with EPA Clean Air Act, Title VI, Rule 608 governing refrigerant management and reporting. Provide documentation showing that the annual refrigerant leakage rate is below 5%, and the leakage over the remainder of unit life is being maintained below 30%.

Supplementary Application Guidance

If connecting to a central system containing CFC refrigerants operate according to USEPA criteria and plan for phasing out the CFC refrigerants. The use of CFCs in central plants is an ongoing issue for the campus environment. Systems using CFCs are older and less efficient than newer systems using modern refrigerants. It is in the best interests of all to phase out the use of CFCs from several perspectives including ozone depletion, global warming potential, and energy efficiency. When funds are lacking to modernize central chiller plants, the use of third party financing may be a viable alternative if the energy savings from the new equipment can pay for the initial investment. Consider contracting with an energy services company that fronts the equipment, guarantees savings, and is paid out of a share of the savings.

EA Credit 1: Optimize Energy Performance

Application Guidance

Requirements

This credit applies to each building within the project scope. To receive a single rating for a group of buildings, use a weighted average for the group of buildings based on their conditioned square footage, or aggregate the data into one PRM calculation, so that performance is achieved by buildings of varying sizes within a certifying group. Each building must still meet EA Prerequisite 1 and may receive its own rating if that is desired.

Supplementary Application Guidance

Consider energy sources such as waste heat or recovered resources. Reduced energy cost may reflect the effect of time-dependent valuation of energy (time-of-use) rates or demand charges when working in conjunction with permanently installed efficiency or storage systems. Environmental impacts result from the operation and expansion of energy infrastructure both on and off site. Application of the more efficient combined heat and power systems and energy storage systems may be applied more effectively in the campus environment. Since the buildings are rated based upon the energy (and its cost) that crosses the building boundary, more efficient central energy systems and thermal storage should be used as the basis of energy cost reductions in the calculation of the building's energy performance. Calculation instructions for Version 2.1 and 2.2 will be supplied as supplements to the respective Reference Guides.

EA Credit 2: On-Site Renewable Energy

Application Guidance

Requirements

A group of buildings may be evaluated on a group average, based on square footage, or each building may receive its own rating.

Submittals

For multiple buildings either use aggregate data in the Submittal Template and provide a list of the buildings or provide a Submittal Template for each building.

Supplementary Application Guidance

Consider orientation of the buildings as a group for maximum access to renewable energy. A central renewable energy system may be more cost effective than individual systems on the separate buildings. In the case where the renewable energy equipment is not physically located

on the applicant building(s), provide data for each building showing the projected energy consumption and the percentage to be met with their prorated or dedicated share of renewable energy. The owner should also submit a certification letter acknowledging that the renewable energy from a central system will apply only to the submitted project(s) and will not be applied to subsequent buildings for any future LEED certifications.

Another campus consideration may be the energy used to light pathways and other connective routes between multiple buildings in a group. For Version 2.1, the energy benefit of solar-powered pole lights can be applied to EA Credit 2 (Renewable Energy) on a special calculation basis. Normally, site lighting is not included in the ASHRAE 90.1 energy model unless attached to the building. After the energy modeling is completed, add the unregulated site lighting's electricity requirements to the design case's Regulated Subtotal (DEC) and add the solar-powered pole lights' contribution to it. This special calculation method awards the use of the technology within the appropriate context. The pole lighting contribution is not to be factored into EA Credit 1 calculations. Version 2.2 Option 1 accounts for site lighting within the updated referenced standard.

EA Credit 3

1 Point

Additional (Enhanced) Commissioning

Application Guidance

Requirements

Each building in a project must independently meet the requirements of this credit.

Supplementary Application Guidance

The Reference Guide elaborates that the intent of the credit is that "The Additional Commissioning Credit ensures peer review through independent, third party verification." An employee in the owner's organization, who is not responsible for the management or design of the project and who has the appropriate credentials, may serve as the "independent" commissioning authority. For example, if a university has architects who design the campus buildings, an engineer from the facility management staff can be considered the independent commissioning authority.

EA Credit 4

***Version 2.1:* Ozone Protection**

***Version 2.2:* Enhanced Refrigerant Management**

Application Guidance

Requirements

Each building in a multiple building project must meet the requirements of this credit in order to achieve it. In a campus setting, even if the project is only a single building, this often involves a central plant.

Version 2.1: If the building(s) is (are) connected to a central chilled water system, that system must be HCFC free or a commitment must be in place to phasing out HCFC-based refrigerants within 5 years from completion of the project.

Version 2.2: If the building(s) is (are) connected to a central chilled water system, that system must meet the credit requirements.

Supplementary Application Guidance

This credit is problematical to some campus situations where the central system is not owned by the campus operator. Negotiations with the chilled water supplier may be effective in getting their commitment to comply with v2.1 or v2.2 requirements. For Version 2.2, have the chilled water supplier perform the required calculations and submit a letter showing compliance.

In the selection of refrigerants, consider their global warming potential as part of the analysis criteria. A life-cycle analysis that includes the future impact of the Montreal Protocol should guide choice of refrigerants.

EA Credit 5: Measurement and Verification

Application Guidance

Requirements

Each building in a project must independently meet the requirements of this credit.

Submittals

If there are multiple buildings, attach a list of the buildings meeting the credit criteria. Separate M&V plans may be required for buildings that significantly differ.

Supplementary Application Guidance

Consider adding the functions that meet the requirements of this credit to a central energy management and control system for the campus. This would allow a continuous commissioning process for the building and maintenance issues could be centrally alarmed and personnel dispatched to keep systems in peak operating mode.

EA Credit 6: Green Power

Application Guidance

Requirements

Green power may be purchased on a centralized basis and credit attributed to a specific project. This same green power may not be credited to another project.

Submittals

Provide certification that any purchased green power is solely applied as credit to this project. If more than one building is to receive credit, provide data for each building showing the projected energy consumption of the buildings and the percentage to be met with green power. If the green power is generated by a campus entity, show that it meets Green-e standards.

Supplementary Application Guidance

Volume discounts are available from some Green Tag brokers. Therefore, it may be financially advantageous to the campus owner if multiple buildings are achieving this credit. Cogeneration from renewable sources (that meet Green-e standards) would be credited in EA Credit 2. Consider ID Credits for exemplary performance when 100% of green power content is used for extended periods.

MATERIALS & RESOURCES

MR Prerequisite 1: Storage & Collection of Recyclables

Application Guidance

Requirement

A central sorting and collection facility serving multiple buildings will also meet the intent of this credit as long as provisions are made for the collection of the recyclable materials within each building.

Submittals

If a central facility is used for sorting and/or temporary storage, include a narrative that succinctly describes collection procedures, frequency (based on generation estimates) and facilities.

MR Credit 1.1 to 1.3: Building Reuse

Application Guidance

Submittal

If there are multiple buildings in the project scope, enter aggregate data in the primary Submittal Template. Also provide one hardcopy version of the Submittal Template for each building's data.

MR Credit 2: Construction Waste Management

Application Guidance

Submittals

If there are multiple buildings in the project scope, enter aggregate data in the Submittal Template.

Supplementary Campus Application Guidance

Additional strategies for campuses include documenting salvage that occurs by owner organizations prior to the building being turned over to contractors for demolition including

offering materials to academic programs on campus such as fine arts or architectural studios or for troop construction projects on military installations.

MR Credits 3 through 7

Application Guidance

Submittals

If there are multiple buildings in the project scope, enter aggregate data in the Submittal Template.

INDOOR ENVIRONMENTAL QUALITY

EQ Prerequisite 1: Minimum IAQ Performance

Application Guidance

Requirements

If there are multiple buildings on the project site, each building must independently meet the requirements.

EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control

Application Guidance

Requirements

If there are multiple buildings on the project site, each building must independently meet the requirements.

Version 2.1 projects can use any Version 2.2 compliance path (v2.2 requirements are simply a compilation of v2.1 credit rulings).

Submittals

List all buildings and identify which method was used on each.

EQ Credit 1: Carbon Dioxide (CO₂) Monitoring

Application Guidance

Requirements

If there are multiple buildings on the project site, each building must independently meet the requirements.

EQ Credit 2: Ventilation Effectiveness

Application Guidance

Requirements

If there are multiple buildings on the project site, each building must independently meet the requirements.

EQ Credit 3.1 and 3.2: Construction IAQ Management Plan

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

Version 2.1 projects can use any Version 2.2 compliance path (v2.2 requirements are simply a compilation of v2.1 credit rulings).

EQ Credit 4.1: Low-Emitting Materials - Adhesives & Sealants

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

Supplementary Application Guidance

Version 2.2 requirements are more stringent than Version 2.1.

EQ Credit 4.2: Low-Emitting Materials - Paints and Coatings

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

Supplementary Application Guidance

Version 2.2 requirements are more comprehensive (and thus more stringent) than Version 2.1.

EQ Credit 4.3: Low-Emitting Materials - Carpet

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

EQ Credit 4.4: Low-Emitting Materials - Composite Wood

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

Supplementary Application Guidance

Version 2.2 requirements are more comprehensive (and thus more stringent) than Version 2.1.

EQ Credit 5: Indoor Chemical & Pollutant Source Control

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

EQ Credit 6.1: Controllability of Systems- Perimeter Spaces

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

Supplementary Campus Application Guidance

Examine trade-offs of natural ventilation using operable windows in spaces that will need to be darkened for projection equipment. Some types of power operated black-out shades can be pulled from their tracks by breezes through large window openings. If natural ventilation is a priority and power shades are also required, employ strategies that do not utilize the glazing area of the exterior walls.

EQ Credit 6.2: Controllability of Systems, Non-Perimeter Spaces

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

EQ Credit 7.1: Thermal Comfort- Compliance with ASHRAE 55-1992

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

Supplementary Campus Application Guidance

Version 2.1 projects can use the Version 2.2 compliance path (v2.2 requirements are simply a compilation of v2.1 credit rulings).

EQ Credit 7.2: Thermal Comfort- Permanent Monitoring System

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

EQ Credit 8.1 and 8.2: Daylight and Views

Application Guidance

Requirements

If there are multiple buildings on the project site, then each building must independently meet the requirements.

INNOVATION & DESIGN PROCESS

ID Credit 1.1 – 1.4: Innovation in Design

Application Guidance

In the campus setting and with multiple buildings, additional innovative opportunities arise, specifically with infrastructure and site issues. Economies of scale allow for more creativity and application of initiatives with larger scopes. The strategies and documentation for achieving innovation credits related to the site may be “duplicated” in multiple buildings or multiple applications for separate buildings, provided a clear description of how the whole site achieves the intended credits is presented. It must be clear that none of the required areas or facilities is counted twice. Each credit should be carefully assessed and treated fairly, respective of overall site issues (e.g., pervious surfaces) versus individual building issues (e.g., roofing). For example, if the project is applying for SSc5.2, which requires that permanent open space be designated adjacent to the building, the area of this open space must reflect the combined footprints of all of the buildings.

An innovation credit is warranted if activities and/or programs inspired by a LEED project are applied to the campus as a whole, thus delivering correspondingly larger environmental benefit.

ID Credit 2: LEED Accredited Professional

No application guidance is necessary.

LEED Credit Paragraph	Project Location	Building CTR Substitution Permitted	Site CTR Substitution Permitted	Required Points Strategy	YELLOW ITEMS: GD please fill in indicating whether site will earn these credits and return to COS. GREEN ITEMS: GD please review and confirm feasibility/revise as needed and return to COS. BLUE ITEMS: GD please highlight any added building and shared points proposed.
LEED 2.2 Strategy Table					

BUILDING: BRIGADE/BATTALION HQ FACILITIES

PAR	FEATURE				REMARKS
CATEGORY 1 – SUSTAINABLE SITES					
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	NIC	NO	R	Site CTR is primary permittee. Building CTR is secondary permittee to primary permittee.
SS1	Site Selection	NIC	NO		Site CTR responsible.
SS2	Development Density & Community Connectivity	NIC	NO		Site CTR responsible.
SS3	Brownfield Redevelopment	NIC	NO		Site CTR responsible.
SS4.1	Alternative Transportation: Public Transportation Access	NIC	NO		Site CTR responsible.
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	NO	NO	1	Combined Bldg/Site credit. Site CTR responsible for bicycle storage. Building CTR responsible for shower/changing rooms.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 1	NIC	YES		Site CTR responsible.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 2	NIC	YES	1	Site CTR responsible.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 3	NO	NO		Combined Bldg/Site credit.
SS4.4	Alternative Transportation: Parking Capacity	NIC	YES	1	Site CTR responsible.
SS5.1	Site Development: Protect or Restore Habitat	NIC	YES		Site CTR responsible.
SS5.2	Site Development: Maximize Open Space	NIC	YES	1	Site CTR responsible.
SS6.1	Stormwater Design: Quantity Control	NIC	YES		Site CTR responsible.
SS6.2	Stormwater Design: Quality Control	NIC	YES		Site CTR responsible.
SS7.1	Heat Island Effect: Non-Roof	NIC	YES		Site CTR responsible.
SS7.2	Heat Island Effect: Roof	YES	NIC	1	Building CTR responsible.
SS8	Light Pollution Reduction	NO	NO	1	Combined Bldg/Site credit. Building CTR responsible for building lighting rqmts. Site CTR responsible for site lighting rqmts.
CATEGORY 2 – WATER EFFICIENCY					
WE1.1	Water Efficient Landscaping: Reduce by	NIC	YES	1	Site CTR responsible.
WE1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	NIC	YES	1	Site CTR responsible.
WE2	Innovative Wastewater Technologies - OPTION 1	NO	NO		Combined Bldg/Site credit.
WE2	Innovative Wastewater Technologies - OPTION 2	NIC	YES		Site CTR responsible.
WE3.1	Water Use Reduction: 20% Reduction	YES	NIC	1	Building CTR responsible.
WE3.2	Water Use Reduction: 30% Reduction	YES	NIC	1	Building CTR responsible.
CATEGORY 3 – ENERGY AND ATMOSPHERE					
EAPR1	Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	NO	NO	R	Building CTR responsible for commissioning of building systems. Site CTR responsible for commissioning of site systems.
EAPR2	Minimum Energy Performance (PREREQUISITE)	NO	NIC	R	Building CTR responsible.
EAPR3	Fundamental Refrigerant Management (PREREQUISITE)	NO	NIC	R	Building CTR responsible.

LEED Credit Paragraph	Project Location	Building CTR Substitution Permitted	Site CTR Substitution Permitted	Required Points Strategy	YELLOW ITEMS: GD please fill in indicating whether site will earn these credits and return to COS. GREEN ITEMS: GD please review and confirm feasibility/revise as needed and return to COS. BLUE ITEMS: GD please highlight any added building and shared points proposed.
LEED 2.2 Strategy Table					

BUILDING: BRIGADE/BATTALION HQ FACILITIES

PAR	FEATURE				REMARKS
EA1	Optimize Energy Performance	YES	NIC	6	Building CTR responsible. Must comply with EPACT
EA2	On-Site Renewable Energy	YES	NO		Proposed credit must fall within CTR scope or be coordinated with other CTR.
EA3	Enhanced Commissioning	NO	NO		
EA4	Enhanced Refrigerant Management	YES	NIC	1	Building CTR responsible.
EA5	Measurement & Verification	YES	NIC		Building CTR responsible.
EA6	Green Power	NO	NIC		Building CTR responsible.

CATEGORY 4 – MATERIALS AND RESOURCES

MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	NO	NIC	R	Building CTR responsible.
MR1.1	Building Reuse: Maintain 75% of Existing Walls, Floors & Roof	N/A	N/A		
MR1.2	Building Reuse: Maintain 95% of Existing Walls, Floors & Roof	N/A	N/A		
MR1.3	Building Reuse: Maintain 50% of Interior Non-Structural Elements	N/A	N/A		
MR2.1	Construction Waste Management: Divert 50% From Disposal	NO	NO	1	Combined Aggregate credit. Building CTR responsible for diversion of minimum 50% of waste generated. Site CTR responsible for diversion of minimum 50% of waste generated.
MR2.2	Construction Waste Management: Divert 75% From Disposal	NO	NO		Combined Aggregate credit. Building CTR responsible for diversion of minimum 75% of waste generated. Site CTR responsible for diversion of minimum 75% of waste generated.
MR3.1	Materials Reuse: 5%	NO	NO		Combined Cumulative credit. Building CTR responsible for 5% materials reuse. Site CTR responsible for 5% materials reuse.
MR3.2	Materials Reuse: 10%	NO	NO		Combined Cumulative credit. Building CTR responsible for 10% materials reuse. Site CTR responsible for 10% materials reuse.
MR4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	NO	NO	1	Combined Cumulative credit. Building CTR responsible for minimum 15% recycled materials. Site CTR responsible for minimum 1% recycled materials.
MR4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	NO	NO		Combined Cumulative credit. Building CTR responsible for minimum 30% recycled materials. Site CTR responsible for minimum 1% recycled materials.
MR5.1	Regional Materials:10% Extracted, Processed & Manufactured Regionally	NO	NO	1	Combined Cumulative credit. Building CTR responsible for minimum 3% regional materials. Site CTR responsible for minimum 30% regional materials.
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally	NO	NO		Combined Cumulative credit. Building CTR responsible for minimum 6% regional materials. Site CTR responsible for minimum 60% regional materials.
MR6	Rapidly Renewable Materials	YES	NIC		Building CTR responsible.
MR7	Certified Wood	YES	NIC		Building CTR responsible.

CATEGORY 5 – INDOOR ENVIRONMENTAL QUALITY

EQPR1	Minimum IAQ Performance (PREREQUISITE)	NO	NIC	R	Building CTR responsible.
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	NO	NO	R	Smoking is prohibited in non-residential federal facilities. Building CTR responsible for building ETS control features. Site CTR responsible for site ETS features.
EQ1	Outdoor Air Delivery Monitoring	YES	NIC		Building CTR responsible.

LEED Credit Paragraph	Project Location	Building CTR Substitution Permitted	Site CTR Substitution Permitted	Required Points Strategy	<p>YELLOW ITEMS: GD please fill in indicating whether site will earn these credits and return to COS. GREEN ITEMS: GD please review and confirm feasibility/revise as needed and return to COS. BLUE ITEMS: GD please highlight any added building and shared points proposed.</p>
LEED 2.2 Strategy Table					

BUILDING: BRIGADE/BATTALION HQ FACILITIES

PAR	FEATURE				REMARKS
EQ2	Increased Ventilation	YES	NIC		Building CTR responsible.
EQ3.1	Construction IAQ Management Plan: During Construction	YES	NIC	1	Building CTR responsible.
EQ3.2	Construction IAQ Management Plan: Before Occupancy	YES	NIC	1	Building CTR responsible.
EQ4.1	Low Emitting Materials: Adhesives & Sealants	YES	NIC	1	Building CTR responsible.
EQ4.2	Low Emitting Materials: Paints & Coatings	YES	NIC	1	Building CTR responsible.
EQ4.3	Low Emitting Materials: Carpet Systems	YES	NIC	1	Building CTR responsible.
EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	YES	NIC	1	Building CTR responsible.
EQ5	Indoor Chemical & Pollutant Source Control	YES	NIC	1	Building CTR responsible.
EQ6.1	Controllability of Systems: Lighting	YES	NIC		Building CTR responsible.
EQ6.2	Controllability of Systems: Thermal Comfort	YES	NIC		Building CTR responsible.
EQ7.1	Thermal Comfort: Design	YES	NIC	1	Building CTR responsible.
EQ7.2	Thermal Comfort: Verification	YES	NIC		Building CTR responsible.
EQ8.1	Daylight & Views: Daylight 75% of Spaces	YES	NIC		Building CTR responsible.
EQ8.2	Daylight & Views: Views for 90% of Spaces	YES	NIC		Building CTR responsible.

CATEGORY 6 – FACILITY DELIVERY PROCESS

IDc1.1	Innovation in Design	YES	YES		Proposed credit must fall within CTR scope or be coordinated with other CTR.
IDc1.2	Innovation in Design	YES	YES		Proposed credit must fall within CTR scope or be coordinated with other CTR.
IDc1.3	Innovation in Design	YES	YES		Proposed credit must fall within CTR scope or be coordinated with other CTR.
IDc1.4	Innovation in Design	YES	YES		Proposed credit must fall within CTR scope or be coordinated with other CTR.
IDc2	LEED Accredited Professional	NO	NO	1	
TOTAL				29	

APPENDIX P

LEED Registration of Army Projects

15 April 2010

Number of Registrations

Each building must be registered separately, except multiple instances of a standard building on a shared site may be registered as a single project. If a single registration for multiple buildings is chosen, all buildings under the single registration must earn exactly the same points. Do not register buildings that are exempt from a specific LEED achievement requirement.

Typical Registration Procedure

1. Login, complete the online registration form (see guidance below) at the GBCI LEED Online website <http://www.gbci.org/DisplayPage.aspx?CMSPageID=174> and submit it online.
2. Pay the registration fee via credit card (USACE staff: credit card PR&C is funded by project design or S&A funds).
3. GBCI will follow up with a final invoice, the LEED-online passwords and template information.
4. The individual who registers the project online is, by default, the Project Administrator.

Completing the Registration Form

BEFORE YOU BEGIN:

Create a personal account with USGBC if you do not have one.

You will need the following information:

Project name as it appears in P2 (obtain from USACE Project Manager)

Building number/physical address of project

Zip code for Installation/project location

Anticipated construction start and end dates

Total gross area all non-exempt buildings in registration

Total construction cost all non-exempt buildings only (see Project Details Section instructions below)

ACCOUNT/LOGIN INFORMATION

1. The person registering the project **must have an account with USGBC** (login and password) to complete the form. Go to <http://www.gbci.org/>, click on "register a project" at the drop-down menu for project certification (at the top of the page) and select "register now for LEED 2009" to start the project registration process. If you have an account, login with your email address and password and select "register new project" to proceed. If you do not have an account, you may select "register a new account" and follow the instructions. It is recommended that you create an account separately on the USGBC website before you start the form. IMPORTANT: USACE team members are members of USGBC and are eligible for Member prices. USACE team members registering projects should be sure to include the USACE Corporate Access ID in their personal account profile (if you do not have it contact richard.l.schneider@usace.army.mil or judith.f.milton@usace.army.mil for the number).
2. The Account/Login Information section is filled out by the person registering the project. It may be a Contractor or a USACE staff member.

ELIGIBILITY SECTION

Follow directions (accepting the terms and conditions)

Review your profile information and make corrections if needed

RATING SYSTEM SELECTION SECTION

Select single project registration and I know which rating system.

Select the rating system - currently only LEED-NC and LEED for Homes are approved for Army use without special approval.

LEED Minimum Program Requirements: select YES

RATING SYSTEM RESULTS SECTION

Confirm selected rating system.

PROJECT INFORMATION SECTION

Project Title: Begin the project title with a one-word identifier for the Installation. Do not include the word "Fort". After this match the project name used in P2 (contact the USACE Project Manager for this information) and identify the building being registered. Example: "Stewart 4th IBC - DFAC".

Project Address 1 and 2: This is the physical location of the project. Provide building number, street address, block number or whatever is known to best describe the location of the project on the Installation.

Project City: Installation Name

State, Country, Zip Code: Self-explanatory

Anticipated Construction Start and End Dates: Self-explanatory – give your best guess if unknown. Note that required data entry format is: 1 or 2 digit month/1 or 2 digit date/4 digit year (example 3/23/2010)

Gross Square Footage: Provide total area all buildings in LEED project. Exclude the area of any buildings that are exempt from the LEED achievement requirement (for example, exclude an unconditioned storage shed to be constructed with a barracks complex).

Is Project Confidential: Indicate NO except, if project has security sensitivity (elements that are FOUO or higher security), indicate YES.

Notification of Local Chapter: Indicate NO unless Government/USACE Project Manager requests you to indicate YES.

Anticipated Project Type: Select the most appropriate option from the drop-down menu.

Anticipated Certification Level: Select the applicable option from the drop-down menu (Silver is the usual level).

PROJECT OWNER INFORMATION SECTION

Project Owner First Name, Last Name, email, phone, address: The Project Owner is the USACE Project Manager. Obtain this info from the USACE Project Manager.

Organization: U.S. Army Corps of Engineers. This field MUST be completed this way because it will be used as a search field by higher HQ to find all USACE registered projects. You may supplement it with district name at the end but DO NOT revise or use an acronym.

May we publish Owner information: Indicate NO

Owner Type: Pick Federal Government from drop-down menu.

Project Owner Assertion: Check the box

PAYMENT INFORMATION

Self-explanatory

APPENDIX Q
REV 1.1 – 31 MAY 2009
AREA COMPUTATIONS

Computation of Areas: Compute the "gross area" and "net area" of facilities (excluding family housing) in accordance with the following subparagraphs:

(1) Enclosed Spaces: The "gross area" is the sum of all floor spaces with an average clear height $\geq 6'-11"$ (as measured to the underside of the structural system) and having perimeter walls which are $\geq 4'-11"$. The area is calculated by measuring to the exterior dimensions of surfaces and walls.

(2) Half-Scope Spaces: Areas of the following spaces shall count as one-half scope when calculating "gross area":

- Balconies
- Porches
- Covered exterior loading platforms or facilities
- Covered but not enclosed passageways and walks
- Open stairways (both covered and uncovered)
- Covered ramps
- Interior corridors (Unaccompanied Enlisted Personnel Housing Only)

(3) Excluded Spaces: The following spaces shall be excluded from the "gross area" calculation:

- Crawl spaces
- Uncovered exterior loading platforms or facilities
- Exterior insulation applied to existing buildings
- Open courtyards
- Open paved terraces
- Uncovered ramps
- Uncovered stoops
- Utility tunnels and raceways
- Roof overhangs and soffits measuring less than 3'-0" from the exterior face of the building to the fascia

(4) Net Floor Area: Where required, "net area" is calculated by measuring the inside clear dimensions from the finish surfaces of walls. If required, overall "assignable net area" is determined by subtracting the following spaces from the "gross area":

- Basements not suited as office, special mechanical, or storage space
- Elevator shafts and machinery space
- Exterior walls
- Interior partitions
- Mechanical equipment and water supply equipment space
- Permanent corridors and hallways
- Stairs and stair towers
- Janitor closets
- Electrical equipment space
- Electronic/communications equipment space

RMS SUBMITTAL REGISTER INPUT FORM			CONTRACT NUMBER		DELIVERY ORDER																				
TITLE AND LOCATION																									
Button	<-----Right click for Instructions		TYPE OF SUBMITTAL								CLASSIFICATION				REVIEWING OFFICE										
SECTION	PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	01 - PRECON SUBMITTALS	02 - SHOP DRAWINGS	03 - PRODUCT DATA	04 - SAMPLES	05 - DESIGN DATA	06 - TEST REPORTS	07 - CERTIFICATES	08 - MFRS INSTRUCTIONS	09 - MFRS FIELD REPORT	10 - O&M DATA	11 - CLOSEOUT SUBMITTALS	FO - FOR INFORMATION ONLY	GA - GOVERNMENT APPROVED	DA - DESIGNER OF RECORD APPROVAL	CR - CONFORMANCE REVIEW	DA / CR	DA / GA	DO - DISTRICT OFFICE	AO - AREA OFFICE	RO - RESIDENT OFFICE	PO - PROJECT OFFICE	DR - DESIGNER OF RECORD	AE - ARCHITECT / ENGINEER
00 72 00	52.236-13	Accident Prevention Plan	X													X				X					
00 73 00	1.11	Dev. From Accept. Design. No Deviation from Contract					X										X							X	
00 73 00	1.11	Dev. From Accepted Design - Deviates from Contract					X											X		X				X	
00 73 00	1.17	Supplemental Price Breakdown	X											X						X					
00 73 00	1.18	SSHO Qualifications	X												X					X					
01 10 00	5.2.3.1	(if concrete pavement) Joint Layout Plan with design drawings					X									X									
01 10 00	5.5.2	Building Envelope Sealing Performance Testing						X						X						X					
01 10 10	***	Tests as Req by Codes - DOR Develops Test Program						X						X						X				X	
01 10 00	5.8.3	BAS Review Information		X													X			X				X	
01 10 00	5.8.3	BAS Performance Verification Test						X						X						X				X	
01 10 00	5.8.4	Testing Adjusting and Balancing						X						X						X				X	
01 10 00	5.8.5	Commissioning						X						X						X				X	
01 10 00	6.15	Environmental As Required for Site Specific					X									X				X				X	
01 10 00	6.16	Permits as required for Site specific					X									X				X				X	
01 10 00	5.10.2	Fire Protection Tests						X	X					X						X				X	
01 32 01.00 10	3.4.1	Preliminary Project Schedule	X												X					X					
01 32 01.00 10	3.4.2	Initial Project Schedule	X												X					X					
01 32 01.00 10	3.4.3	Design Package Schedule	X												X					X					
01 32 01.00 10	3.6.1	Periodic schedule updates from the Contractor	X												X					X					
01 32 01.00 10	3.7	Time Extension Request (Schedule)	X												X					X					
01 33 00	1.8	Submittal Register - DOR Input Required	X												X					X				X	
01 33 00	1.8	Submittal Register Updates (Design Packages, etc.)	X												X					X				X	
01 33 00	1.3.1	Substitution of Manuf or Model Named in Proposal		X	X												X			X				X	
01 33 16	1.2	Identify Designer(s) of Record	X												X					X				X	
01 33 16	1.1.2 / 3.2.4	Fast Track Design Package(s)					X									X				X					
01 33 16	1.2	Identification of all Designers of Record	X													X				X					
01 33 16	3.2.1	Site and Utility Des Package, incl. Substantiation					X									X				X					
01 33 16	3.2.2/3.5	Interim Des Subm Package(s), incl. Substantiation					X									X				X					
01 33 16	3.5.1	Drawings					X									X				X					
01 33 16	3.5.2.2	Sitework Design Analyses					X									X				X					
01 33 16	3.5.2.3	Structural Design Analyses					X									X				X					
01 33 16	3.5.2.4	Security Design Analyses					X									X				X					
01 33 16	3.5.2.5	Architectural Design Analyses					X									X				X					
01 33 16	3.5.2.6	Mechanical Design Analyses					X									X				X					
01 33 16	3.5.2.7	Life Safety Design Analyses					X									X				X					
01 33 16	3.5.2.8	Plumbing Design Analyses					X									X				X					
01 33 16	3.5.2.9	Elevator Design Analyses (as Applicable)					X									X				X					
01 33 16	3.5.2.10	Electrical Design Analyses					X									X				X					
01 33 16	3.5.2.11	Telecommunications Design Analyses					X									X				X					
01 33 16	3.5.2.12	Cathodic Protection Design Analyses					X									X				X					
01 33 16	3.5.3	Geotechnical Investigations and Reports					X									X				X					
01 33 16	3.5.4	LEED Submittals					X									X				X					
01 33 16	3.5.5	Energy Conservation Documentation					X									X				X					
01 33 16	3.5.6	Specifications					X									X				X					
01 33 16	3.5.7	Building Rendering					X									X				X					
01 33 16	3.2.4/3.7	Final Des Submittal Package(s), incl. Substantiation					X									X				X					
01 33 16	3.7.5	DD Form 1354 (Transfer of Real Property)										X				X				X					
01 33 16	3.2.5/3.8	Design Complete Submittal Package(s)					X									X				X					
01 33 16	3.3.3	Design and Code Review Checklists					X									X				X					
01 33 16	A-2.0	SID - Interim and Final (as applicable)			X	X	X								X					X					
01 33 16	B-2.0	FFE (as Applicable)					X								X					X					
01 45 04.00 10	3.2	Design and Construction QC Plan	X													X				X					
01 57 20.00 10	1.2	Environmental Protection Plan	X													X				X					
01 78 02.00 10	1.2.1	Final as-Built Drawings										X			X										
01 78 02.00 10	1.2.3.11	Non-Hazardous Solid Waste Diversion Reports						X						X						X					
01 78 02.00 10	1.2.7	Provide final as-built CADD and BIM Model files										X		X						X					
01 78 02.00 10	1.2.9	Provide scans of all other docs in Adobe.pdf format										X		X						X					
01 78 02.00 10	1.3.1	Equip-in-Place list of all installed equip and cost										X		X						X					
01 78 02.00 10	1.3.2	Data on equip not addressed in O&M manuals										X		X						X					
01 78 02.00 10	1.3.3	Final as-built specs - electronic files										X		X						X					
01 78 02.00 10	1.4.2.1	Warranty management plan - FAR 52.246-21										X		X						X					
01 78 02.00 10	1.4.2.1	Certificates of Warranty for extended warranty items										X		X						X					
01 78 02.00 10	1.4.2.1	Contractor's POCs for implementing warranty process										X		X						X					
01 78 02.00 10	1.4.2.1	List of each warranted equip, item, feature or system										X		X						X					
01 78 02.00 10	1.5	See also Section 01 10 00 par. 5.8.4 and 5.8.5										X		X						X					
01 78 02.00 10	1.6.1.2	Equipment O&M Manuals - 1 electronic / 2 hard copies										X		X						X					
01 78 02.00 10	1.7	Field Training DVD Videos									X			X						X					
01 78 02.00 10	1.8	Pricing of CF/CI and GF/CI Property										X		X						X					
01 78 02.00 10	1.11	List of Completed Cleanup Items										X				X				X					



**DESIGN SPECIFICATION FOR CONSTRUCTION OF
FIRE DETECTION AND FIRE SUPPRESSION**

6 MAY 2009

FLW FIRE PROTECTION & PREVENTION DIVISION STAFF POC.

Ralph Mills, Fire Protection Specialist. 573-596-1379 (Office Direct Dial)
573-512-0834

Kevin Curtis, Fire Protection Inspector 573-596-0131 Ext. 6-7126
573-512-1243

Introduction

The purpose of these specifications is to describe information, references and recommended practices relating to Life Safety, Fire Protection, and Mass Notification. It was developed to standardize the design and construction of fire protection and mass notification systems at facilities throughout the Fort Leonard Wood, Missouri. These guidelines are intended to convey the minimum standards to successfully provide reliable fire protection and mass notification systems. It is further intended that design engineers tailor this document with respect to specific project requirements at Fort Leonard Wood while maintaining a standardized system configuration as required by the latest edition of UFC 3-600-01 Fire Protection Engineering for Facilities, and UFC 4-021-01, Mass Notification Systems. This standard supersedes all previous local fire department design standards.

Application

This document has been developed as a guideline; it is not the intent of this document to limit, restrict, or discourage anyone from enhancing the specifications to fit specific requirements in a given area or situation. However, the minimum standards shall not be compromised.

Orientation/Pre-design Meeting

The A/E orientation and/or pre-design meeting are crucial to any part of a project to ensure a full understanding of fire protection and mass notification goals and expectations. The Fire Protection Engineer shall be an integral part of the design team, and shall be involved in every aspect of the design as it relates to fire protection. During orientation/pre-design, the project scope should be secured and a design strategy established. Expectations unique to the facility will be conveyed by the Fire Prevention Plan Review Staff.

Design Analysis

A fire protection design analysis is required for all designs and shall address the fire protection and mass notification requirements of the project as required by UFC 3-600-01 and UFC 4-021-01. The following is a guide to the minimum design analysis required at the earliest stage possible in the design process.

The contractor shall verify and confirm in writing at shop drawing submittal that fire alarm and mass notification systems will meet intelligibility requirements per UFC 4-021-01. A test of intelligibility will be performed per the UFC.)

Code Analysis

Utilize the latest version of applicable codes and standards. Unified Facilities Criteria (UFC) UFC 3-600-01 Fire Protection Engineering, UFC 4-021-01 Mass Notification, the National Fire Protection Association Codes (NFPA) and the International Building Code (IBC) are the principal codes used. UFC 3-600-01, and UFC 4-021-01, Mass Notification Systems, provide detailed guidance for incorporating fire protection and mass notification engineering measures in the design and construction of Department of Defense (DOD) facilities. NFPA 101, Life Safety Code is the primary code for which we must comply. The IBC should be used primarily to determine allowable building construction sizes for the specific occupancy and construction type. The IBC should also be used to address other building code criteria not covered by UFC 3-600-01 and NFPA standards (i.e. building separation requirements, minimum construction standards, etc.). Other applicable codes and standards include, but are not limited to, ADA requirements. All equipment and material shall comply with the applicable provisions of NEMA, FM, UL, and CSA.

Fire Alarm Reporting Systems

The current FLW Fire Alarm Central Station Radio Receiving System is a Monaco D500 Plus system that operates using VHF bandwidth (138.925MHz) and DTMF protocol. The fire alarm central system is located off the Installation at the Pulaski County (PC) E-911 Center and Bldg 580, Fire Station 1 on FLW. The Monaco Transmitter at each building should be a BT2-4 until December 31, 2009. *Note: Monaco is discontinuing the D-500 and BT2-3/4's Transceivers effective 31 December 2009.*

The Fire Reporting System will be upgraded during 2009. The FLW Fire Protection & Prevention Division has requested an equipment upgrade to a Monaco D-21 based using the FSK control protocol, via a single frequency. The Monaco transceiver shall be a BT-XF and be required on all projects completing during 2010. The Monaco BT-XF shall have the capability of reporting 60 zones for fire.

MASS NOTIFICATION (MNS)

The FLW Wide-Area Mass Notification Central Control Station is a Wheelock / ATI CCSWH system that operates using UHF bandwidth (407.870MHz) and FSK protocol. The mass notification central system is located at building 3200 on the Installation within the Emergency Operations Center (EOC). EOC uses a React-4000 computer system for local MNS. The switch over between the mass notification (MNS) and fire alarm system (FAS) shall be automatic. The

systems must be user friendly and shall not require resetting by the user in the buildings. Note: Separate wireless transmitters/receivers (transceivers) are required for the fire alarm and mass notification central systems. When local MNS micro-phone is required, a remote secured panel or keyed micro-phone lock-out shall be required next to the annunciator panel unless location is specified.

Programming EOC Mass Notification Computer: The programming is a contractual agreement. Call the EOC at 573-563-5157 for details. Coordination with Fire Alarm/Mass Notification Acceptance Testing by the FLW Fire Protection & Prevention Division is required.

FIRE ALARM SYSTEMS (FAS)

Fire Alarm Control Panel shall be an intelligent addressable panel. The system shall be activated into alarm mode by the actuation of any alarm initiating device. The system shall remain in the alarm mode until the initiating device is reset through the fire alarm control panel manually restored or through a supervised automated receiver to the normal operating mode. Main fire alarm control panel and auxiliary panels shall be colored red and marked for the fire alarm system. Note: The fire department would prefer intelligent addressable panel with a integral radio alarm transceiver compatible with the base fire alarm receiving system when applicable for space savings, training of fire alarm repair technician, standardization of alarm maintenance, and reduce overall cost.

Fire Reporting System Programming. The fire alarm designer shall provide the Fire Prevention Plan Review Staff upon submittal of plans, specifications and the addressing data of the point of contact for the fire alarm control panel to determine the number of zone-id's that will be required for programming the BT-XF and the installation fire reporting system.

Notification Appliances. Strobes with clear lens & red housing shall be used for building equipped with Fire Alarm System. Strobes for MNS shall be Amber lens with white housing. The MNS strobes shall be synchronized with the fire alarm strobes. Strobes will be located as required by ADAAG and NFPA 72. Strobes will be provided in common areas, restrooms, meeting areas, and other spaces required by the ADAAG. Note: One piece notification device with red housing is permitted for FAS/MNS.

Fire Alarm System Performance and Integrity:

- (1) **Notification Appliance Circuits:** The notification appliance circuits (NACs) shall be Class A per NFPA 72 Chapter 6.4 and perform per NFPA 72 Chapter 6.7. The fire alarm system amplifiers, circuits, wiring shall not be more than 75% loaded. If a mass notification system fails the intelligibility test, then it easy for a contractor to add more speakers provided the circuit is not fully loaded. Many speakers each at low power increases intelligibility. Few speakers each at high power results in less intelligibility. Contractors should be advised to put a speaker in every occupied room. If not, then he must be ready to add speakers if the intelligibility test fails.

- (2) **Initiating Device Circuit:** The initiating device circuits (IDCs) shall be Class A per NFPA 72 Chapter 6.4 and perform per NFPA 72 Chapter 6.5. All addressable initiating devices shall be of the intelligent bi-directional type and listed for use with applicable control panels. Conventional initiating devices are to be used only in conjunction with addressable interface modules where environmental conditional prevent intelligent devices to be installed.
- (3) **Signal Line Circuits:** The signal line circuits (SLCs) shall be a class A Style 7 per NFPA 72 Chapter 6.4 and perform per NFPA 72 Chapter 6.6.

Wiring Method of Fire Alarm System: The wiring method used shall comply with applicable codes i.e. NFPA 70, 72, 101 be approved by the local FLW AHJ prior to installation. All conduits, fittings, and junction boxes used for fire alarm circuits shall be labeled and provided with specific identifying characteristics (i.e. painted red) and the fire alarm circuit identification shall be accomplished in accordance with NFPA 70 Art 760.30. Wiring method used shall be installed in such fashion that outgoing and return conductors, exiting and returning to control units, respectively, are separately routed and encased (both wire sets shall be enclosed in separate conduit lines where each conduit line is also geographically separate). The outgoing and return (redundant) circuit conductors shall not run in the same cable assembly, enclosure or raceway per NFPA 72 Chapter 6.

Fire Alarm System Remote Display (Graphic Annunciator) located in the lobby vestibule shall be used in large buildings, multi-story buildings, and secured buildings. Graphic annunciator shall have a plan view of the building. Indicator lamps shall be shown on the plans. LEDs shall be red for alarm condition, amber for supervisory malfunction condition, and yellow for trouble condition. Plan views shall be approximately to scale and in no case smaller than 15 inches in length or width. Annunciator shall have a door with piano hinge and two point cylinder lock or two cylinder locks. Lock shall be operable using the same key as the FACP to lock out switches.. Annunciator shall contain a LED test switch, audible trouble signal and a trouble switch to silence the audible alarm, but not extinguish the trouble LED. Annunciator shall be surface mounted.

For other buildings a remote annunciator panel will be required in the lobby/vestibule shall have a minimum of a reset switch, trouble switch, silence switch, and LED test switch with indicating lights and addressable visual monitor. Lock shall be operable using the same key as the FACP to lockout switches.

Notification Appliances Device Specification. Strobes with clear lens & red housing shall be used for building equipped with Fire Alarm System. Strobes for MNS shall be Amber lens with white housing. The MNS strobes shall be synchronized with the fire alarm strobes. Strobes will be located as required by ADAAG and NFPA 72. Strobes will be provided in common areas, restrooms, meeting areas, and other spaces required by the ADAAG. *Note: One piece notification device with red housing is permitted for FAS/MNS.*

Initiating Devices Specification: Initiating Devices shall be analog addressable unless environmental conditions warrant otherwise the initiating devices shall be in according to their specific application for protection and as required by applicable codes and references.

(1). Manual Pull Stations. Dual action manual pull stations shall be installed in gymnasiums, schools and similar areas where they may be subject to false activation or mechanical jarring. Single action pull stations should be used in other areas as required. Do not use manual pull stations with break-glass rods. All pull stations will be key accessible.

(2). Photo Electric Smoke Detector shall be used when such detectors are required. Under floor detectors shall be indicated on the graphic annunciator panel showing the detector location in respect to the floor plan. Detectors shall be application specific to the facilities and equipment being protected.

(3). Heat Detectors when required shall be combination rate of rise heat detectors for wide temperature range changes are expected (i.e. over ovens, fuel-fired equipment, attic areas, etc.). Fixed temperature heat detectors shall be installed where wide temperature range changes are not expected. The temperature rating of fixed temperature detectors shall be based on the maximum ambient temperature expected in the facility in conjunction with manufacturer's recommendations. Heat detectors shall be resettable from FACP. NFPA 72 will be followed.

(4). Duct Detectors and spot type smoke detectors shall be installed on separate zones. Duct detection will not be used to replace open area detectors. Each duct smoke detector shall have a remote indicator/or test station located in an accessible space.

(5). Beam Detectors may be utilized in areas susceptible to false alarms and other areas where conventional detection is not feasible i.e. industrial operations, high ceilings, etc. and shall have a remote indicator/or test station located in an accessible space.

Acceptance Testing. Fire detection and suppression systems shall be tested in accordance with applicable NFPA codes and manufacture requirements. Prior to starting operational testing of a fire alarm system, notify the Contracting Officer and Fire Prevention Plan Review Staff at least five days in advance for scheduling this event. A Fire Prevention representative must be present during all test phases and procedures. Use applicable NFPA and manufactures checklists to accomplish testing of these systems. Upon full acceptance of testing on a fire detection/suppression systems, the installing contractor shall provide a written record of test completion verifying that NFPA and manufacture's requirements have been met. Voice intelligibility (CIS readings) for mass notification per the UFC 4-021-01 shall be required as part of acceptance testing. Provide all documentation for testing, to include manufacture data and installed equipment sheets.

Fire Alarm Control & Mass Notification Panels and Sprinkler Riser Location

All panels and sprinkler risers shall be located in mechanical room near the outside mechanical room door. User not permitted access to this room. All equipment shall have a minimum 36 inches separation from other mechanical room equipment. Spacing required for firefighter access.

Contractor Training

The Contractor shall provide Government maintenance personnel the capability to operate, maintain, test, repair, and expand the system, to include as a minimum, the following.

- (1) Contractor shall provide all software: database with complete identification and addresses for all programmable system equipment and devices, and all other systems programming data on all modes of the system: connecting cables; and proprietary equipment necessary for the operation, maintenance, testing, repair, and reprogramming, etc. of the system, to include that which may be required for implementation of future changes to the fire alarm system (additional and/or relocated initiating devices, notification devices, etc).
- (2) Contractor shall provide all system and equipment technical data and computer software with the requisite rights to use by the government.
- (3) Contractor shall provide fire department personnel two basic training sessions on the operation of the fire alarm and mass notification.

TEMPORARY BUILDING NUMBERS

The contractor shall be required to obtain the assigned Building Number from DPW. A temporary building sign will be required at each entrance to the building and shall be Brown background with white letters. The sign shall be visible from the road. This is required for EMS & Fire response.

HOT WORK PERMITS

FLW Fire Protection & Prevention Division Prevention Unit issues the "HOT WORK PERMIT". A permit will be issued for the length of the project for each building and will issue the permits at the start of the project. It shall be the responsible of the contractor to make copies furnished to each sub-contractor and to notify each day of hot work activity at 573-596-0883.

FIRE HYDRANTS

The FLW Fire Protection & Prevention Division recommends the use of Mueller Centurion as per the Installation Design Guild (IDG), or a Clow Medallion, when fire hydrants are part of the project. If existing fire hydrants are to provide coverage for a new project or major renovation, that the existing fire hydrants that provide protection to that building be replaced. The contractor shall paint the fire hydrant Brown in color as per the IDG. The fire hydrant shall be color coded

per UFC 3-600-01 section 3-7.3.1 Fire Flow and Marking of Hydrants shall be accomplished by marine type reflective tape around the brim of the bonnet.

SPRINKLER SYSTEMS

If required shall be installed in accordance to UFC 3-600-01 and NFPA 13.

- (1) Post Indicator Value shall be required on Sprinkler systems. Tamper switch is required.
- (2) Fire hydrants shall be required within 150 feet of the fire department pre-connection.
- (3) Fire Department connections because of force protection 25 meter regulation shall three to eight feet curb/sidewalk side of streets and parking lots where applicable.
- (4) Hydrostatic Testing and Acceptance Testing shall be witnessed by the Fire Prevention Unit Staff.
- (5) FLW Installation in some areas has a spiking problem with the water system. So a pressure reducer maybe required on the sprinkler system.
- (6) Backflow preventers are required on the sprinkler systems and jockey pumps.

STANDPIPES

- (1) Wet or Dry Standpipes maybe required on projects as needed in relation to Force Protection and fire department access. UFC 3-600-01 Section 4-5.1. Fire Department connections because of force protection 25 meter regulation shall three to eight feet curb/sidewalk side of streets and parking lots where applicable. Contractor shall contact the Fire Prevention Unit Plan Review Staff for determination.

PENETRATION

Fire Wall penetrations shall be sealed as per application and code. Fire wall penetration for DOIM cable trays and wiring, Cable TV, and Phone Service shall use an EZ-PATH type system that permits installers to install wiring under normal conditions, but will seal in case of fire.

FLOW TESTING

FLW Fire Protection & Prevention Division will conduct flow testing of water supply for projects requiring sprinkler systems upon written request. It will be responsibility of the Fire Protection Engineer to determine if the flow test shall be a witness test.

FIRE DEPARTMENT ACCESS.

Knox Box is required on all permanent buildings. The type of Knox Box (recess or surface mount) and color will be determined during the design review. The Knox Box must be keyed to the FLW Fire Protection & Prevention Division account. An approved application will be

furnished to contractor upon request. Note: When contractor receives the Knox Box, Fire Prevention Staff will need to verify the keying of the lock before installation. The Knox Box will be installed at the nearest exit to the annunciator panel or at the outside door of the mechanical/electrical room where the FACP is installed when no annunciator panel are required.. The Knox box will have tamper switches connected to the supervisory side of the fire alarm system that transmits a trouble signal to the E-911 center if the Knox Box is tampered with. Generally, on building with brick exterior finish, a recess mounted Knox Box will be required. Knox Box #3275 Dark Bronze with tamper switches and #3290 recessed mounting kits will be required. For building that need surface mounting, Knox Box #3266 Dark Bronze with tamper switches will be required.

GATED/FENCED FACILITIES

- (1) Knox Key Switch override keyed to the FLW Fire Protection & Prevention Division Knox Box account shall be required on all electric control gates.
- (2) For non-electric gates and force protection requirements a residential Knox Box keyed to the Fire Department Knox Box account shall be required on the gate post or bollards at each entrance.
- (3) FLW Fire Protection & Prevention Division may furnish to contractors a lock box for the contractor keys when the building is enclosed for emergency access.

CONTRACTORS SITE OFFICE AND STORAGE TRAILERS.

- (1) Construction Site Offices will be installed to ACOE standards. At least one 5 lb ABC Dry Powder Fire Extinguisher will be visible and accessible in each trailer.
- (2) Separation between office trailers and storage trailer will be 10 feet. Storage trailer/Conex may sit next to each other.
- (3) A 20 LB ABC Fire Extinguisher shall be accessible in the storage trailer/Conex area.

FIRE EXTINGUISHERS

Fire Extinguisher and fire extinguisher cabinets shall be provided as part of the contract. The FLW installation generally uses 10 lb. or 20 lb ABC type dry powder. 5lb ABC type dry powder are permitted in housing, perm. Perm. Party Quarters and etc. Fire extinguishers shall be installed in accordance IAW NFPA 10. UFC 3-600-01 requires fire extinguishing cabinets. *Note: Issues have arisen in the past where the fire extinguisher cabinets are the wrong size for the fire extinguishers used.*

HOOD & DUCT SYSTEMS

Hood and duct systems for commercial cooking equipment that produces smoke or grease-laden vapors must comply with IAW NFPA 96. System will be a Class K wet extinguishing system

and will also include a class K portable fire extinguisher located per IAW NFPA 96. Openings in duct shall be provided at the sides or the top of the duct whichever is more accessible, and at changes in direction. Horizontal ducts require access every 12 feet; vertical ducts require access at each floor.

O & M and As-Built Drawings.

COE Projects: Provide through the COE to the Fire Protection & Prevention Division in Micro Station CADD format and PDF two copies of CD's As-builts and one copy of O & M and ½ size prints of plans for the Fire Alarm, and Mass Notification System. This is need for fire preplanning, programming the Fire Reporting System and fire alarm/mass notification repairs.

Other Projects: Provide through the Contracting Officer to the Fire Protection & Prevention Division in Micro Station CADD format and PDF two copies of CD's As-builts and one copy of O & M and ½ size prints of plans for the Fire Alarm, and Mass Notification System. This is need for fire preplanning, programming the Fire Reporting System and fire alarm/mass notification repairs.

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**KCD CADD STANDARDS
FOR
MILITARY AND CIVIL WORKS PROJECTS**

1. APPLICABILITY. Effective with all new military and Civil projects, KCD will use, as a guide, the sheet numbering and CADD file naming system as shown in the latest version of the A/E/C CADD Standard as published by The CADD/GIS Technology Center. This document will provide specific guidance as to the implementation of the standard as used in the Kansas City District. It also addresses some of the items not delineated in the CADD standards, which are required to provide uniformity among disciplines and consistency with current and future projects.

2. REFERENCE: BQP 5.6.07, [Management of Electronic Files](#) , [Project File Structure](#), [A/E/C CADD Standard \(Release 2.0\)](#)

3. DRAWING FILE CREATION. The following steps are required in order to create a new drawing file:

[STEP 1: Determine CADD file type.](#)

[STEP 2: Determine and assign a file name.](#)

[STEP 3: Determine drawing working units.](#)

[STEP 4: Select and attach seed file.](#)

[STEP 5: Attach border \(reference\) file.](#)

STEP 1: Determine CADD file type. All drawing files are either “sheet” files or “model” files. The use of Model Files is mandatory for any drawing that may be used as a reference file by another discipline. In vertical construction all floor plans and elevations (architectural, structural, mechanical, electrical etc) shall be drawn in model files. Each floor of a building shall be in a separate model file. All model files shall be registered one directly above another. The border file shall be considered a model file. Elevations may be located in a single model file or as separate model files for each elevation view, as determined by the Project Development Team (PDT). File naming convention is different for model files and sheet files (*See Step 2 below*).

STEP 2: Determine and assign a file name.

A. Standard Sheet File Naming (*for one building, one volume drawing set*):

Each CADD sheet file will be given a unique file name that is derived from the project location, project code, discipline, sheet type, and the sequential number of sheets within the type. Drawing names will contain 9 characters with a three (3) character extension. (*See [paragraph 5](#) for file and sheet naming conventions regarding multiple building/multiple volume drawing sets*). An example format for a standard sheet file is as follows: **L05_AE102.DGN**

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L	05	-	AE	1	02	.DGN
L O C A T I O N	P R O J E C T C O D E		D I S C I P L I N E	S H E E T T Y P E	S E Q U E N C E	T Y P E O F F I L E

LOCATION.

Military Location codes are as follows:

G	GRAND FORKS AFB, NORTH DAKOTA
K	LAKE CITY ARMY AMMUNITION PLANT
L	FORT LEONARD WOOD, MISSOURI
M	MCCONNELL AFB, KANSAS
R	FORT RILEY, KANSAS
U	US Army Reserve
V	FORT LEAVENWORTH, KANSAS
W	WHITEMAN AFB, KANSAS

Civil Works Location codes are as follows:

BC	BRUSH CREEK
BR	BLUE RIVER
BS	BLUE SPRINGS
CL	CLINTON LAKE
DC	DAVID CITY
HA	HARLAN COUNTY
HL	HILLSDALE LAKE
HT	HARRY S. TRUMAN
KA	KANOPOLIS
KC	KANSAS CITY
KR	KANSAS RIVER
LT	LITTLE BLUE
LB	LONGBRANCH
LV	LONGVIEW LAKE
ME	MELVERN LAKE
MI	MILFORD LAKE
MK	MILL CREEK
MO	MISSOURI RIVER

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OS	OSAGE
PA	PAOLA
PE	PERRY LAKE
PO	POMONA LAKE
RA	RATHBURN
SM	SMITHVILLE LAKE
ST	STOCKTON LAKE
TK	TURKEY CREEK
TT	TUTTLE CREEK
WA	WAYNESVILLE
WE	WELDON SPRINGS
WI	WILSON LAKE

PROJECT CODE. Project codes are assigned by IM at the time of Project creation on the server. The code is sequential as projects are created. The subdirectory created for a project will consist of the project location and code and the name of the project. In the past, project folders on the server (E drive) were identified with only 3 digits (i.e., R27, L06, etc.) It is now common to see project folders with additional descriptive letters as shown in the examples below. Although the project folder (directory name) is permitted to have a longer name, CADD file names within a directory will use only the first 3 digits (i.e., R27). Examples :

CIVIL WORKS:BC05 (*PROSPECT BRIDGE on Brush Creek*)**MILITARY:**R16_CDC (*CHILD DEVELOPMENT CENTER, Fort Riley*)

L36_FY08BARRACKS (FY08 Barracks, Fort Leonard Wood)

DISCIPLINE. Disciplines (general) are designated by the following codes:

AE	ARCHITECTURAL
B-	GEOTECHNICAL
C-	CIVIL
E-	ELECTRICAL
G-	TITLE, LEGEND, AND BORDERS
IN	INTERIOR DESIGN
S-	STRUCTURAL
M-	MECHANICAL
P-	PLUMBING
V-	SURVEY

Each discipline requires 2 characters. Therefore designators using only one letter, such as "E" must be followed by a dash ("-") so the completed discipline code is "E-". The designer or sheet originator shall determine the correct discipline designator for each sheet based on drawing content. See the following appendices for each discipline's designators:

[Architectural – Appendix A](#)
[Civil – Appendix B](#)
[Electrical – Appendix C](#)
[Interior Design – Appendix D](#)
[Mechanical – Appendix E](#)
[Structural – Appendix F](#)

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SHEET TYPE. See KCD CADD Standards appendices A through F for sheet type descriptions and designators.

SEQUENCE. The drawing sequence number within the discipline and sheet type: Sequences less than 10 are padded with zeroes in the file name.

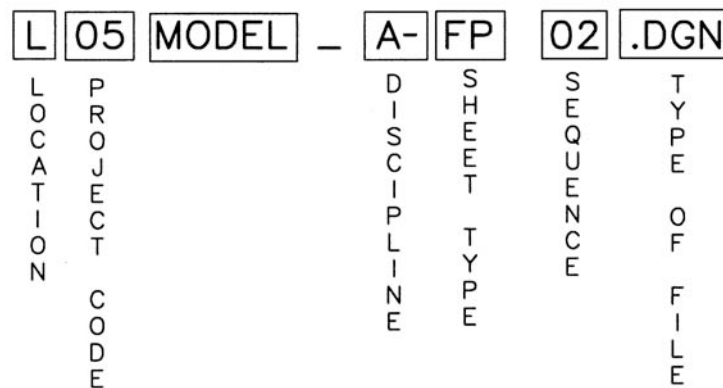
CADD SYSTEM FILE TYPE. CADD system file types are as follows:

DGN MICROSTATION DESIGN FILES
DWG AUTOCAD DESIGN FILES

The CADD file type designator is provided only in the CADD directory file name and on the project index sheet. It is not required in the file name block on the border sheet.

B. Model File Naming:

Model files contain the design elements for numerous sheet files. Model file naming conventions are very similar to sheet file conventions with some exceptions. The word "MODEL_" must be inserted immediately after the project code to indicate model files. Sheet type codes are different from regular sheet files and are provided in the A/E/C CADD Standard in Chapter 2, Table 4. An example file name format for a model file is as follows: **L05MODEL_A-FP02.DGN** (*architectural floor plan model file.*)



Once the file name has been determined it should be entered in the CREATE DESIGN FILE dialog box in Microstation, within the selected project folder (directory). (See Figure 1.1)

The project folder is a collection of all project related files, including documents (i.e., word, excel spread sheets, reports), photos, etc. All project-related CADD files should be located in the project directory under a subfolder entitled "Drawings." Only those drawings required to produce the set of contract drawings should be placed in this subfolder. Other files such as user files, junk files, back-up files, etc. should be located in subfolders named after and created by the individual user of those files.

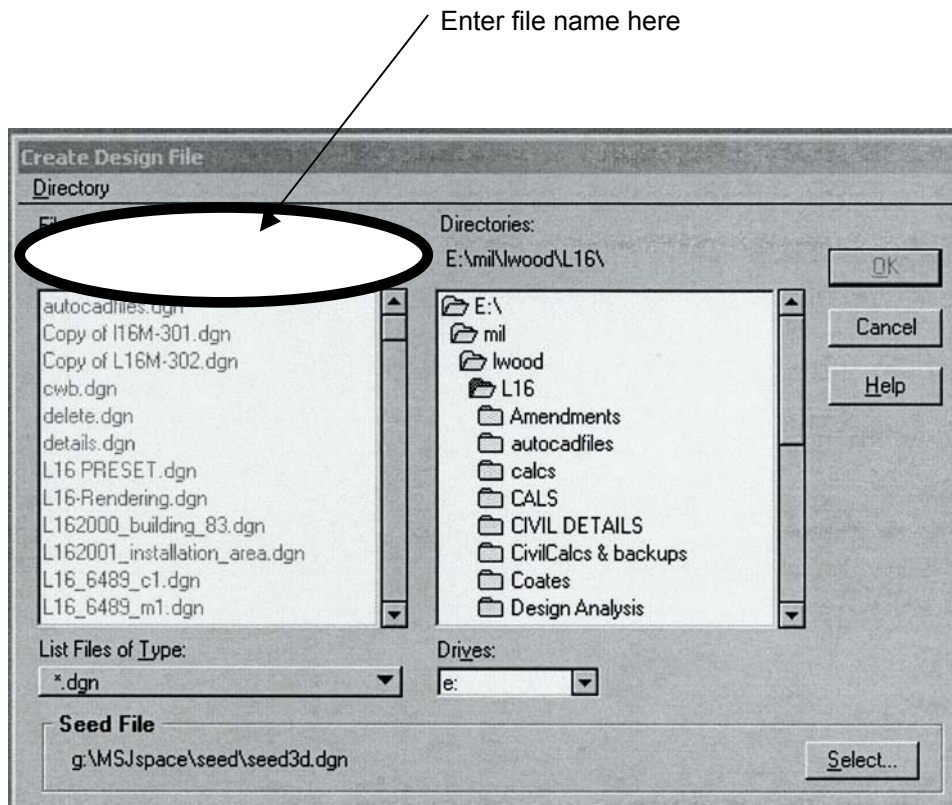


Figure 1.1

STEP 3: Determine drawing working units.

Vertical Construction projects may be designed in either English (inch-pound) or metric units. Project unit of measure will be determined by the PM (project manager) in concert with the PDT before design process begins, based on customer preference and the unit of measure most advantageous to the government.

Remodel and rehabilitation work, including vertical construction, levee's, channels, etc. may be done in English units, if the original construction and as-built drawings are in English units.

Working Units for MicroStation:

	<u>MU</u>	<u>SU</u>	<u>PU</u>
English AEC	1ft	12 inch	8000
English Civil	1ft	100	10
Metric AEC	1mm	1	100
Metric Civil	1M	1000	1

AEC working units are used primarily for vertical construction or design features requiring a high level of CADD precision. Civil working units are primarily used by civil disciplines for site, survey, and mapping files. It is typical to have both AEC and Civil working unit files in the same project,

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however, the PDT should develop a plan to determine which working units will be used to maintain compatibility.

STEP 4: Select and attach seed file.

SEED FILES: Seed files automatically set sheet file defaults for dimensioning, color table, view attributes, locks, AEC global positioning, display depth, active depth, etc. in accordance with the A/E/C CADD Standard and KCD standards. Although these defaults can be changed by the designer/engineer, it is highly recommended that the defaults remain in place to provide consistency from drawing sheet to drawing sheet. This is especially important with regard to referencing of files from one sheet to another. Seed files are available in both 2d and 3d files. Select seed file based on 2d vs. 3d and required working units. Design files should typically be selected as 3d. 3d files ensure compatibility with other CADD features and programs such as INROADS, 3D rendering, and fly-throughs. 2d files should be limited to schedules and text-type files.

Available AEC seed files are:

Arch_2d_E.dgn	AEC 2 dimension foot-pound (English)
Arch_3d_E.dgn	AEC 3 dimension foot-pound (English)
Arch_2d_M10.dgn	AEC 2 dimension metric 10pu
Arch_3d_M10.dgn	AEC 3 dimension metric 10pu
Arch_2d_M100.dgn	AEC 2 dimension metric 100pu
Arch_3d_M100.dgn	AEC 3 dimension metric 100pu

Civil seed files: are based on the survey file.

Seed files are selected by “hitting” the SELECT button in the CREATE DESIGN FILE dialog box (See Figure 1.2)

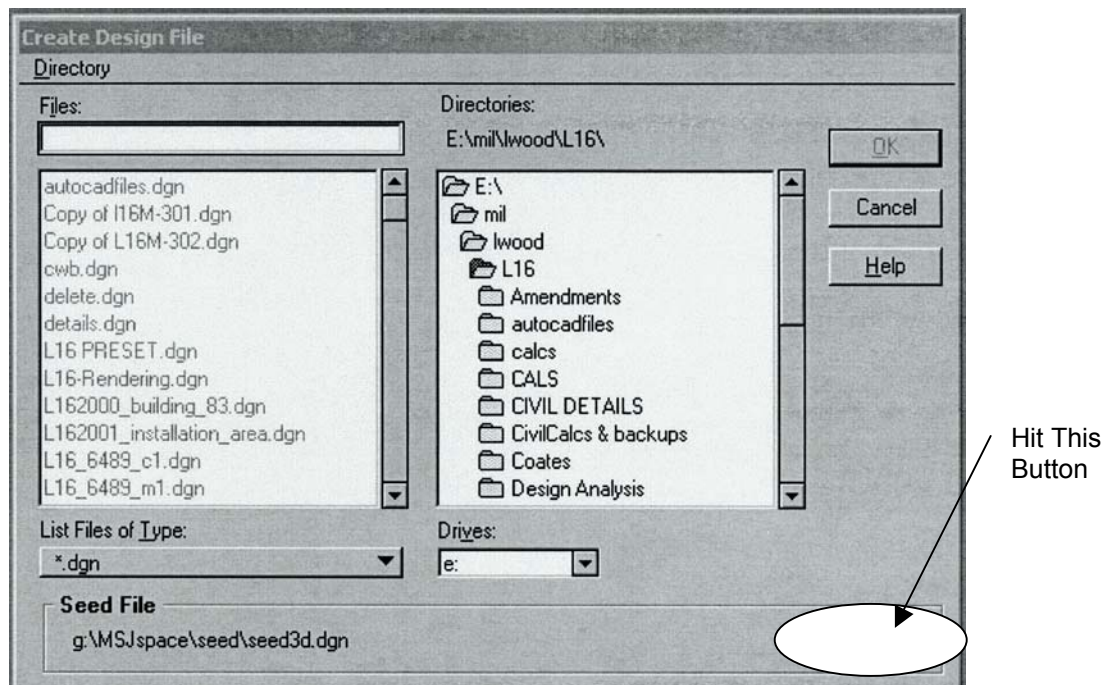


Figure 1.2

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The Border file shall be created as a 2 dimensional (2d) model file and placed in the project directory. This allows it to be attached as a reference file to both 2d and 3d project sheet files. The border shall be placed in the file life size, English (2'-0" x 3'-0"), Metric (609.6mm x 914.4mm). Generic project border files for both English and metric units of measure and for both AEC and civil drawings have already been created as cells and are currently located in the following cell library:

<G:\MSJspace\cell\MilCon\Borders.cel>

IMPORTANT NOTE: It is recommended that at the beginning of the project design phase, a single team member be assigned to create the required project border file by abstracting the correct border file cell from the cell library and creating a project border model file. With input from the PM, the border sheet originator shall make the necessary changes in the title block information (project name, number, date, drawing code, etc.) that will be common to all drawing sheets. Example of a border sheet file name:

R13MODEL_G-BS01.DGN

There should never be more than one border model file per volume per project.

4. SHEET NUMBERING CONVENTION. (Sheet Identifiers) In accordance with the A/E/C CADD Standard, each drawing sheet in a contract set shall be numbered according to the discipline, subject, and sequence within that subject, according to the following syntax examples:

AE502 where "AE" is the discipline designator (Architectural elements), "5" is the sheet type designator (Details), and the "02" is the sequence number.

M-403 where "M-" is the discipline designator (Mechanical elements), "4" is the sheet type designator (Large Scale Views), and the "03" is the sequence number.

This is the correct format for the sheet number entry of drawing title blocks. Note that only the sequence numbers are padded with zeroes when they are less than 10. Specific designators for disciplines and sheet types for KCD drawing files are provided in Appendices A through F and are based on those shown in the A/E/C CADD Standard.

5. SPECIAL RULES FOR PROJECTS WITH MULTIPLE BUILDINGS.

Often, a contract will include the design of multiple buildings or features which are to be packaged together as a single project under a single contract. Examples are the UEPH and Barracks projects, which included barracks buildings, soldier community buildings, dining facilities and COFs within a single project. Under these circumstances, it is desirable to number the drawing sheets and name the CADD files in a manner which identifies the building or feature to which each drawing applies.

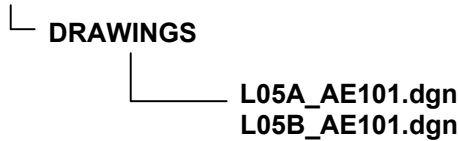
5.1 File Naming. There are two ways to handle file naming for this type of project. The project could be published with one volume and multiple features/buildings within that volume. It is also permissible to publish multiple volumes with buildings in each volume. The PDT should develop a strategy at the beginning of the project to determine how the project design should be

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packaged. The PDT should also determine volume contents and letters designated to each building and feature.

A. Multiple buildings/ One volume (set) of drawings:

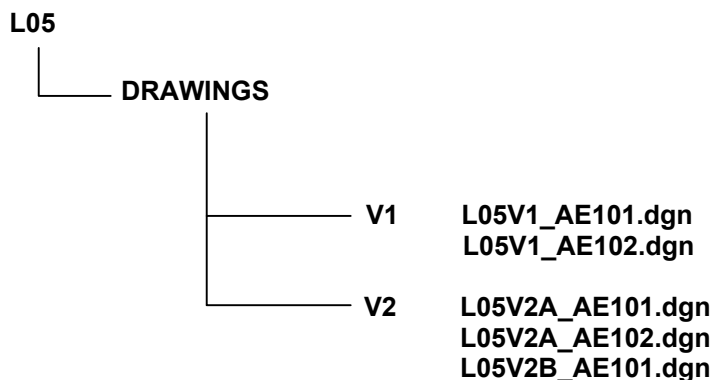
L05

The above is an example of multiple buildings in one volume where it is desirable to separate some sheets by building, but to keep all of the sheets in one volume of drawings for bidding purposes. The A and B are used to designate separate buildings and the under bar separates the project and building designators from the discipline code.

B. Multiple buildings / Multiple volumes of drawings:

Most vertical construction projects will require a separate set (volume) of drawings for each building. If the project 1391 requires multiple buildings to be bid as one project then the problem arises of providing the contractor with the least complex set of bid drawings, while maintaining the ability to separate portions of the project during construction and after construction in the as-built drawings. The general exception to one set of drawings per building would be a barracks complex with multiple dormitory buildings and a Soldier Service Center building as a central service building. The primary reason for one volume of drawings would be the use of common detail sheets for all buildings in the project and the use of common floor plans for repetitive buildings. The prime reason to consider multiple volumes of drawings is the contractor's ability to easily identify all of the plans and details for each separate building during construction and for the end user to find all the as-builts for one building after construction. Projects consisting of multiple buildings of differing usage on the same site should be in separate volumes. An example would be the barracks complex with a dining hall adjacent. The Barracks would be in one volume and the dining hall in another. The site work, if extensive enough could be a third volume or contained in the largest portion of the project. If the dining hall were located on a site removed from the barracks, the both would contain their own separate civil and site drawings with same detail sheets being reproduced in each volume.

Example: Project L05



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The above is an example of file naming and directory structure for a project with multiple volumes and multiple buildings in the same volume. The "L05V1_" defines the file as being in Volume 1 of project L05. The underbar "_" separates the extended project indicator from the discipline designator. In the second Volume, V2, the "L05V2A" indicates the second volume, building A and the "L05V2B" indicates the second volume, building B of the project.

5.2 Sheet Naming & Project Directory Naming. For multi-building projects, a building prefix will be added to the sheet number. Each drawing sheet in a contract set will be numbered according to the building, discipline, subject, and sequence within that subject, according to the following syntax:

B_AE101

where B is the building identifier, and all other characters are the same as described in paragraph 4. Building identifiers should be identified and assigned by the PM and PDT prior to commencement of design work.

All files in a project will reside in the same drawing directory. Subdirectories for different buildings under the same volume will not be used.

Comprehensive examples of file naming conventions for single building, multiple building, multiple volume, and multiple building/multiple volume are located in [Appendix G](#).

6. ENTERING TITLE BLOCK INFORMATION.

Upon completion of referencing in the border sheet for a new sheet file, the title block should be filled in as completely as possible. Examples of the correct text font and attributes for each block are provided as part of the border sheet file just outside the border. These examples should be copied in and edited.

IMPORTANT NOTE: Do not change the text font or attributes without consulting with the project PDT team for concurrence.

Input the following:

Sheet Reference Number. Use naming convention as described in [paragraph 4](#). Use the same text size for both projects having one building (See Figure 1.3) and those projects having multiple buildings (See Figure 1.4).

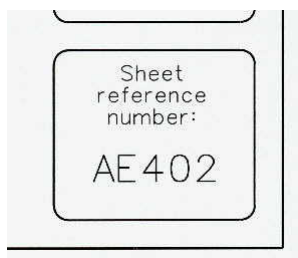


Figure 1.3

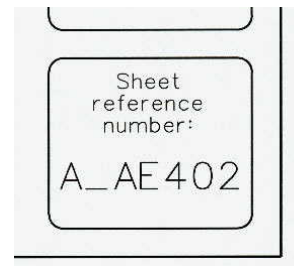


Figure 1.4

Sheet Title (See Figure 1.5). Provide a brief title that describes the sheet content.

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IMPORTANT NOTE: The title provided in the title block must match, exactly, the title listed on the project index sheets. Any abbreviations used in one location must be used in the other. KCD uses third-party software to create CD's and the title information must match at both locations.

FORT LEONARD WOOD PN 55081 TACTICAL VEHICLE SIMULATOR FACILITY	MISSOURI FY03
INTERIOR ELEVATIONS	

Figure 1.5

Designed By (See Figure 1.6). Provide designer/engineer's initials that developed the information shown on the sheet.

Date (See Figure 1.6). Leave Blank. The date will be provided and inputted by the border sheet originator and will appear as part of the border reference file sheet.

Drawn By (See Figure 1.6). Provide initials of person who did the actual CADD work on the drawing. This may be the designer/engineer.

File No. (See Figure 1.6). Leave Blank. The drawing file number will be provided and inputted by the border sheet originator and will appear as part of the border reference file sheet.

Checked By (See Figure 1.6). Provide the initials of the individual who performed the peer review for the drawing. Initials should be entered only after peer review is completed.

Plot Scale (See Figure 1.6). Provide the plot scale selected for the drawing. Example: 1/8" = 1'-0" equals a plot scale of 8:1.

Submitted By (See Figure 1.6). Provide initials of the designer's supervisor.

CADD File Name (See Figure 1.6). Provide the file name developed as per naming conventions provided in paragraphs 3 & 5. Do not include the CADD type extension ".dgn" or ".dwg".

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI	Designed by:	Date: X
	Drawn by:	File no.
	Checked by:	Plot scale:
	Submitted by:	CADD File Name:

Figure 1.6

US ARMY CORPS OF ENGINEERS

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Changes to drawings as a result of amendments or modifications shall be clearly indicated and highlighted on the drawings. All symbols and text used to indicate modifications and amendments shall appear on the sheet file (not the model file). Use the following standard conventions to indicate amendments and modifications:

A. Clouds. Each change on the drawing sheet shall be surrounded by a “cloud” symbol. This symbol can be generated using an MDL command in Microstation by typing in “MDL L CLOUD”. The correct color, line weight and level shall be indicated by an example shown on the right side of the border sheet.

B. Numbered Triangles. Each cloud shall include a corresponding small triangle with a number such as “1” within the triangle. An example, which can be copied into the drawing, is shown on the right hand side of the border sheet in the proper size, level and color. The triangle should be placed close to the appropriate cloud or attached to the cloud with a line (same weight, color and level as the cloud). *The numbering system is provided in [paragraph 7.1](#).*

C. Text Description (Optional). Provide a brief text description of the change if it is not obvious. Use standard (note) text size, color, and line weight. Level shall be the same as the triangle.

D. Revision Block Entries (See Figure 1.7). Amendments and modifications shall also be indicated in the revision block, in the upper right-hand corner of the border sheet. Sample text and triangles, in the required color, line weight, and level, shall be provided to the right hand of the border sheet and should be copied into the active drawing file and edited. Note that all entries in the revision block shall be on Level 5 and shall always be shown (turned on). Entries in the revision block should be made starting at the top of the block and working downwards with successive entries. Entries in the columns shall be as follows:

Symbol Entry: Triangle with corresponding number of modification or amendment.
Number should match the triangle number used on the clouded areas (changes) that correspond to the amendment or modification.

Description Entry: Indicate whether it is an amendment or modification provided by a general description of changes if applicable. DO NOT enter any amendment or modification number unless so directed by the project manager. The description must be general but specific enough to provide some information regarding the changes. Examples of good and bad descriptions are as follows:

Bad Examples: “Amended Sheet”
“Modifications as Shown”

Good Examples: “Amendment – Change Note 4 & Add Notes 6-7”
“Modification – Delete Detail C & D”

Date Entry: Provide a date as agreed upon by the PDT and project manager.

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△	MODIFICATION - REVISE FLASHING ON DETAIL 3	2/7/04	
△	MODIFICATION - ADD INSULATION TO DETAIL 4	6/30/03	
△	MODIFICATION - DELETE GENERAL NOTES	6/14/03	
△	AMENDMENT - CHANGE DETAIL 5	1/20/03	
△	AMENDMENT - CHANGE TEXT NOTES	1/3/03	
Symbol	Description	Date	Appr.

Figure 1.7

7.1 Multiple Amendments and/or Modifications.**A. Most Current Amendment and/or Modification.**

All elements of the most current change to include bubbles, leaders, triangles, and text associated with the change shall be placed on a level 63, with the exception of the revision block text and graphics (triangle) which shall always be placed on level 5 and shall always remain visible on the drawing.

B. Preceding (Previous) Amendments and Modifications.

Each time an amendment/modification is followed by a succeeding amendment/modification on a drawing sheet, the preceding amendment/modification identification graphics and text shall have the level changed or be deleted from the drawing so that only the most current amendment/modification identification graphics and text information are visible. It shall be the responsibility of the discipline's section chief or the individual designer of the drawing sheet to determine if the changes are to be retained on a separate level or deleted from the drawing.

Acceptable options are as follows:

Option 1: Retain all changes. Place most current change on Level 63. Place all previous changes on Level 62. Turning on both levels 62 and 63 would show all amendments and modifications. In summary:

Current Change	LV 63
Previous Changes	LV 62
Revision Block Information	LV 05

Option 2: Retain only most recent change (amendment or modification). Delete all references to previous changes except for the revision block. In summary:

Current Change:	LV 63
Previous Changes:	Delete All Changes
Revision Block Information	LV 05

C. Revision Block Entries.

As noted previously, all amendment and modification changes shall be entered in the revision block and these entries shall always be turned on (LV 05). Each succeeding amendment or

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modification made to a drawing sheet shall be given a new (the next consecutive) number (1, 2, 3, 4, etc.) within the corresponding triangle. This numbering is independent for each drawing sheet and has no corollary with other drawing sheets even though the amended change may be part of the same amendment or modification. In other words, a change as a part of Amendment XYZ could appear as a "1" on drawing sheet no. A-02 because it is the first amended change on that sheet, but a change that is part of Amendment XYZ on drawing sheet no. A-04 could be labeled as "2" because there was a previous change recorded on that sheet.

Succeeding amendments and/or modifications shall be entered in the revision block above the preceding entries using the same format so that they appear in the order in which the changes were made with the most current change appearing on top. (See *Figure 1.7*)

Upon notification that the project contract has been awarded, all amendment graphics and corresponding text information on the drawing shall be deleted from the drawings. Information regarding amendments in the revision block shall always remain.

8. Cell Library Names: Each discipline group is responsible for the maintenance of their individual cell libraries. Existing cell libraries can be found at G:\MSJspace\cell. Cell library "mst8000" is provided as a general library of symbols, etc. used by multiple disciplines. Libraries should be named in the following manner:

Discipline_cell type_eng.cel
Discipline_cell type_met.cel

Example:

Arch_doors_eng.cel (This is an architectural cell library containing cells relating to doors and is in English units)

9. COMMENTS. Comments should be directed to **JOHN HUNT**. All comments or proposed changes shall be coordinated with the CADD standards committee members. Members are as follows:

Jim Turner, EC-DF
Mike Coates, EC-DF
John Hunt, EC-DF
John Connor, EC-DS
Hank Mildenberger, EC-GC

Sheet Type Designators per the New KCD Standard and the CADD Standard

Discipline	Discipline Designator	Sheet Type Designator	Sheet Type	Sheet Examples
Structural, Military	SE	0	General	(symbols, legends, notes, etc.)
Structural, Military	SE	1	Plans	(foundation, floor framing, roof framing, etc)
Structural, Military	SE	2	Elevations	(steel framing, CMU walls, trusses, etc)
Structural, Military	SE	3	Sections	(foundation sections/details)
Structural, Military	SE	4	Large Scale Views	(stair, canopy, dormer plans and associated details)
Structural, Military	SE	5	Details	(primary framing details, steel/CMU/Wood connections, etc)
Structural, Military	SE	6	Schedules and Diagrams	(footing and connection schedules, wind uplift and joist load diagrams, etc)
Structural, Military	SE	7	User defined.	(misc details, typical details, penetration details, etc)
Structural, Military	SE	8	User defined.	(misc structures and associated details)
Structural, Military	SE	9	3D Representations (isometrics and photographs)	photographs, as-built conditions
Structural (General), Civil Works	SE	0	General	(symbols, legends, notes, etc.)
Structural (General), Civil Works	SE	1	Plans	System 1 (bridge, pumping station, conduit layout, dams, etc)
Structural (General), Civil Works	SE	2	Elevations	System 2 (bridge framing, pumping station walls, conduit joint layout)
Structural (General), Civil Works	SE	3	Sections	System 3 (retaining walls)
Structural (General), Civil Works	SE	4	Large Scale Views	System 4 (gatewells, manholes, pumpwells)
Structural (General), Civil Works	SE	5	Details	Details (primary framing details, steel/CMU/Wood connections, etc)
Structural (General), Civil Works	SE	6	Schedules and Diagrams	Schedules and Diagrams
Structural (General), Civil Works	SE	7	User defined.	User defined. (misc details, typical details, penetration details, etc)
Structural (General), Civil Works	SE	8	User defined.	User defined. (misc structures and associated details, flap gates)
Structural (General), Civil Works	SE	9	3D Representations (isometrics and photographs)	3D Representations (isometrics and photographs)
Structural Site, Civil Works	SS	0	General	(symbols, legends, notes, etc.)
Structural Site, Civil Works	SS	1	Plans	System 1 (bridge, pumping station, conduit layout, dams, etc)
Structural Site, Civil Works	SS	2	Elevations	System 2 (bridge framing, pumping station walls, conduit joint layout)
Structural Site, Civil Works	SS	3	Sections	System 3 (retaining walls)
Structural Site, Civil Works	SS	4	Large Scale Views	System 4 (gatewells, manholes, pumpwells)
Structural Site, Civil Works	SS	5	Details	Details (primary framing details, steel/CMU/Wood connections, etc)
Structural Site, Civil Works	SS	6	Schedules and Diagrams	Schedules and Diagrams
Structural Site, Civil Works	SS	7	User defined.	User defined. (misc details, typical details, penetration details, etc)
Structural Site, Civil Works	SS	8	User defined.	User defined. (misc structures and associated details, flap gates, inlets)
Structural Site, Civil Works	SS	9	3D Representations (isometrics and photographs)	3D Representations (isometrics and photographs)
Structural Substructure, Civil Works	SB	0	General	(symbols, legends, notes, etc.)
Structural Substructure, Civil Works	SB	1	Plans	System 1 (bridge piers, building foundations, pier caps)
Structural Substructure, Civil Works	SB	2	Elevations	System 2 (bridges, buildings, pumping stations, rolling gates)
Structural Substructure, Civil Works	SB	3	Sections	System 3 (retaining walls)
Structural Substructure, Civil Works	SB	4	Large Scale Views	System 4 (gatewells, manholes, pumpwells)
Structural Substructure, Civil Works	SB	5	Details	Details (primary framing details, steel/CMU/Wood connections, etc)
Structural Substructure, Civil Works	SB	6	Schedules and Diagrams	Schedules and Diagrams
Structural Substructure, Civil Works	SB	7	User defined.	User defined. (misc details, typical details, penetration details, etc)
Structural Substructure, Civil Works	SB	8	User defined.	User defined. (misc structures and associated details, flap gates, inlets)
Structural Substructure, Civil Works	SB	9	3D Representations (isometrics and photographs)	3D Representations (isometrics and photographs)
Structural Framing, Civil Works	SF	0	General	General (symbols, legends, notes, etc.)
Structural Framing, Civil Works	SF	1	Plans	System 1 (bridges, buildings, rolling gates, tainter gates)
Structural Framing, Civil Works	SF	2	Elevations	System 2 (bridges, buildings, rolling gates, tainter gates)
Structural Framing, Civil Works	SF	3	Sections	System 3 (catwalks, elevated platforms)
Structural Framing, Civil Works	SF	4	Large Scale Views	System 4
Structural Framing, Civil Works	SF	5	Details	Details (primary framing details, steel/CMU/Wood connections, etc)
Structural Framing, Civil Works	SF	6	Schedules and Diagrams	Schedules and Diagrams
Structural Framing, Civil Works	SF	7	User defined.	User defined. (misc details, typical details, penetration details, etc)
Structural Framing, Civil Works	SF	8	User defined.	User defined. (misc structures and associated details, flap gates)
Structural Framing, Civil Works	SF	9	3D Representations (isometrics and photographs)	3D Representations (isometrics and photographs)

Architectural

Discipline Designator	Sheet Type Designator	Sheet Sequence	Sheet Type
AE	0	O1	General (symbols, legends, notes, etc.)
AE	O1		Plans
AE	O2		Elevations
AE	O3		Building Sections/Wall Section
AE	O4		Enlarged plans and sections
AE	O5		Details
AE	O6		Schedules and diagrams
AE	O7		User defined
AE	O8		User defined
AE	O9		3-D
AE	1		Roof plan
AE	1		Reflected Ceiling Plans
AE	O5		Wall types

Interior Design

Discipline Designator	Sheet Type Designator	Sheet Sequence	Sheet Type	Meaning
IF	1	1	Overall Furniture Plans/Layout	Legend
IF	2		Large Scale Plans	Site lighting and utility plans
IF	7		Systems Furniture Details	Exterior Specific Site Power One-Line and diagrams if separated from E-5 series.
IN	1		Enlarged Partial Floor Plans	Exterior Specific OSP diagrams and details if separated from E-6 series.
IN	2		Interior Elevations	Exterior Specific schedules if separated from E-8 series.
IN	5		Details (Enlarged views, sections, etc.)	Exterior Specific details if separated from E-9 series.
IN	6		Finish Schedules	Electrical Interior Demolition / Site Electrical demolition not on CD series drawings.
IN	7		Floor Patterns	Building grounding and Lightning Protection
IN	8		Interior Signage	Interior and building mounted Lighting

Fire Protection Engineering

Discipline Designator	Sheet Designator	Sheet Sequence	Sheet Type	Meaning
F-	0	01	Fire Protection Legend	Legend if combined for FA and FX sheets
F-	1		Life Safety Plan	Building Life Safety Plans
FA	0	01	Fire Alarm Legend	Optional Location, Can be placed with plans if complete legend fits.
FA	1		Fire Alarm Plans	Fire Alarm device and appliance layout plans
FA	2		Fire Alarm Elevations	Special Building elevations that are not details
FA	3		Fire Alarm Sections	Special Building sections that are not details
FA	4		Fire Alarm Enlarged Plans	
FA	5		Fire Alarm Details	
FA	6		Schedules and Diagrams	Fire Alarm Riser Diagram, Matrix, and details
FA	9		3D Representations (isometrics and photographs)	
FX	0	01	Fire Protection Legend	Optional Location, Can be placed with plans or schedules if complete legend fits.
FX	1		Fire Protection Plans	Fire Protection device and appliance layout plans
FX	2		Fire Protection Elevations	Special Building elevations that are not details
FX	3		Fire Protection Sections	Special Building sections that are not details
FX	4		Fire Protection Enlarged Plans	
FX	5		Fire Protection Details	
FX	6		Schedules and Diagrams	Fire Protection Schedules and Diagrams
FX	9		3D Representations (isometrics and photographs)	

Mechanical

Sheet Type Designators per the New KCD Standard and the CADD Standard

Discipline	Discipline Designator	Sheet Type Designator	Sheet Type
Plumbing Demolition	PD	1	Protection, termination, and removal
Plumbing Site	PS	1	Extensions and connections to Civil Utilities
Plumbing	P-	0	General (symbols, legends, notes, etc.)
Plumbing	P-	1	Plans (horizontal views)
Plumbing	P-	3	Sections (sectional views)
Plumbing	P-	4	Large Scale Views (plans or sections)
Plumbing	P-	5	Details
Plumbing	P-	6	Schedules and Diagrams
Plumbing	P-	9	3D Representations (isometrics and photographs)
Mechanical Demolition	MD	1	Protection, termination, and removal
Mechanical Site	MS	1	Extensions and connections to Civil Utilities
HVAC	M-	0	General (symbols, legends, notes, etc.)
HVAC	M-	1	Plans (horizontal views)
HVAC	M-	3	Sections (sectional views)
HVAC	M-	4	Large Scale Views (plans or sections)
HVAC	M-	5	Details
HVAC	M-	6	Schedules and Diagrams
HVAC	M-	9	3D Representations (isometrics and photographs)
Instruments and controls	MI	6	Schedules and Diagrams

Electrical Engineering

Discipline Designator	Sheet Type Designator	Sheet Sequence	Sheet Type	Meaning
E-	0	1	Electrical Legend	Legend
ES	1		Site Plans	Site lighting and utility plans
ES	2		Electrical Site Elevations	Electrical Site elevations that are not details
ES	3		Electrical Site Sections	Electrical Site sections that are not details
ES	4		Electrical Site Enlarged Plans	Electrical Site enlarged plans
ES	5		Electrical Site Diagrams and Schedules	
ES	6		Electrical Site Power, Telecommunications, and Special Systems Diagrams and Details	Exterior Specific Site Power One-Line and diagrams if separated from E-6 series. Exterior Specific OSP diagrams and details if separated from T-6 series.
ES	7		Electrical Site Light Fixture Schedules, Details, and Diagrams	Exterior Specific schedules if separated from E-7 series.
ES	8		Electrical Site Schedules	Exterior Specific schedules if separated from E-8 series.
ES	9		3D Representations (Isometrics, perspectives, photographs)	Exterior Specific if separated from E-9 series.
ED	1		Electrical Demolition Plans	Electrical Interior Demolition / Site Electrical demolition not indicated on CD series drawings.
EG	1		Grounding Plans, Lightning Protection Plans	Building grounding and Lightning Protection.
EL	1		Lighting Plans	Interior and building mounted Lighting
EP	1		Power Plans	Interior Power
EY	1		Special Systems Plans	Interior Special Systems not on T- series sheets.
E-	1		Electrical Plans	Small Project Plans that can have multiple plans on one sheet. Example a Training Range Latrine. This includes Information found on T- series sheets.
E-	2		Electrical Elevations	Electrical Building elevations that are not details
E-	3		Electrical Sections	Electrical Building sections that are not details
E-	4		Electrical Enlarged Plans	Building enlarged Electrical plans
E-	5		Electrical Details	Electrical Details
E-	6		Power Diagrams and Schedules	Power One-Line and Related Schedules
E-	7		Light Fixture Schedules, Details, and Diagrams	Light Fixture Schedules, Details, and Diagrams
E-	8		Schedules	Panelboard Schedules, Electrical Equipment Connection Schedules, Etc.
E-	9		3D Representations (Isometrics, perspectives, photographs)	
T-	1		Telecommunications Plans	Interior network and voice telecommunications
T-	2		Telecommunications Elevations	Telecommunications Building elevations that are separated from E-2 Series sheets.
T-	3		Telecommunications Sections	Telecommunications Building sections that are separated from E-3 Series sheets.
T-	4		Telecommunications Enlarged Plans	Telecommunications enlarged plans separated from E-4 Series sheets.
T-	5		Telecommunications details	Telecommunications details that are separated from E-5 Series sheets.
T-	6		Telecommunications Diagrams	Riser diagrams, legend, and details
T-	7		User Defined not addressed elsewhere	Normally not used
T-	8		User Defined not addressed elsewhere	Normally not used
T-	9		3D Representations (Isometrics, perspectives, photographs)	

ALL AIR SMALL PACKAGE UNITARY SYSTEM

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	ncI/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES		<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES)	< ~ >	ALM/NORMAL	< ~ >	<BI>	~
	RST-BUT	SYSTEM RESET BUTTON	~	~	< ~ >	[~]	~
START/STOP	< ~ >	HEAT-OFF-COOL SWITCH INPUT	~	HEAT/OFF-COOL/ <EMERG>	< ~ >	< ~ >	~
	SYS-OC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< ~ >	< ~ >	NVI	~
	ZN-OC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	OCC/UNOCC	< ~ >	BI	~
	SF-ON/AUTO	SUPPLY FAN ON/AUTO SWITCH	~	ON/AUTO	< ~ >	BI	~
	UNIT STATUS	UNIT STATUS (SEE NOTES)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF	< ~ >	NVO	~
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	< ~ >	< ~ >	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[68-77 DEG F]	< ~ >	AI	~
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCC MODE			< ~ >		~
	SF-SS	SUPPLY FAN START/STOP COMMAND	~	ON/OFF	< ~ >	BO	[~]
	COMP-CLG/HTG	COMPRESSOR (PKG UNIT) COOLING/HEATING MODE	~	CLG/HTG	< ~ >	BO	[~]
	COMP-SS	COMPRESSOR (PKG UNIT) START/STOP	~	ON/OFF	< ~ >	BO	[~]
	EMERG-HTG-2P	EMERG HEATING COMMAND (2-POS)	~	ON/OFF	< ~ >	AO	[~]
		HEATING COIL VALVE PID LOOP SETTINGS	< ~ >	~	< ~ >	~	~
		COOLING COIL VALVE PID LOOP SETTINGS	< ~ >	~	< ~ >	~	~

[illegible]

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
[]	[]	< >	< >
[~]	[~]	< _ >	< _ >
SEE NOTES			
~	~	~	~
~	[~]	< _ >	< _ >
~	~	~	~
~	~	~	~
[~]	X	< _ >	< _ >
[~]	X	< _ >	< _ >
[~]	X	< _ >	< _ >
[~]	X	< _ >	< _ >
[~]	X	< _ >	< _ >
~	~	~	~

[illegible]

Notes:

- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
- 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
- 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULE.
- 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPY MODE FOR 15 MINUTES.
- 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, WHEN THE SYSTEM IS IN OCCUPIED MODE.

HEATING AND VENTILATING UNIT (UNIT VENTILATORY)

SINGLE ZONE WITH HEATING AND DX COILS

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS		ON/OFF	< >	BI	~
	HTG-DA-T-LL	HEATING COIL DISCHARGE TEMPERATURE LOW LIMIT SWITC	[39 DEG F]	ALM/NORMAL	< >	BI	~
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~	< >	[]	~
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >	< >	AI	~
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~	< >	~	~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >	< >	NVI	~
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF	< >	BO	[~]
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_HEAT/ HVAC_OFF	<__>	NVO	~
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED	< >	BO	[~]
		MINIMUM OUTSIDE AIR FLOW SETTING	[__ CFM]	~	< >		~
ZONE TEMPERATURE CONTROL: MA DAMPERS HEATING COIL DX COIL	OA-T	OUTSIDE AIR TEMPERATURE	~	< >	< >	AI	~
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[]	~	< >		~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[]	~	< >		~
		MIXED AIR PID LOOP SETTINGS	< >	~	< >	~	~
	ZN-T	ZONE TEMPERATURE	~	<__>	<__>	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	< >	AI	~
	HTG-V-C	HEATING COIL VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
	DX-V-C	DX UNIT COMMAND	~	< >	< >	< >	~
		HEATING COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~
		DX UNIT PID LOOP SETTINGS	<__>	~	<__>	~	~
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	< >	< >	AI	~
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL	< >	BI	~

Section:

LDP VIEW REQ'D	LDP AND M&C DISPLAY			
	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	<__>	<__>
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	[X]	[~]	<__>	HVAC_STATUS
[~]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	[~]	< >	TEMP_P
[X]	X	[X]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	<__>	TEMP_P
[X]	X	[~]	< >	< >
[X]	X	[X]	< >	< >
[X]	X	[X]	< >	< >
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	[~]	~	< >	< >

LDP OVRD REQ'D	OVERRIDES		
	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	[]	< >	< >
~	~	~	~
[~]	X	< >	< >
	SEE NOTES		
[~]	X	< >	< >
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
[~]	X	< >	< >
[~]	X	< >	< >
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
SUPPLY FAN PROOF FAILED	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
~	~	~
BLDG-T IS LESS THAN BLDG-T-LL	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[~]
[ALM]	[info] [crit]	[]

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING
 - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULEF
 - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED
 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT

SINGLE ZONE WITH HEATING AND COOLING COILS

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF	< >	BI	~
	HTG-DA-T-LL	HEATING COIL DISCHARGE TEMPERATURE LOW LIMIT SWITCH	[39 DEG F]	ALM/NORMAL	< >	BI	~
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~	< >	[]	~
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >	< >	AI	~
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~	< >	~	~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >	< >	NVI	~
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF	< >	BO	[~]
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF	<__>	NVO	~
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED	< >	BO	[~]
		MINIMUM OUTSIDE AIR FLOW SETTING	[] CFM]	~	< >		~
ZONE TEMPERATURE CONTROL:	OA-T	OUTSIDE AIR TEMPERATURE	~	< >	< >	AI	~
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[]	~	< >		~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[]	~	< >		~
		MIXED AIR PID LOOP SETTINGS	< >	~	<__>	~	~
	ZN-T	ZONE TEMPERATURE	~	<__>	<__>	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	< >	AI	~
	HTG-V-C	HEATING COIL VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
	CLG-V-C	COOLING COIL VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
COOLING COIL		HEATING COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~
		COOLING COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	< >	< >	AI	~
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	<__>	ALM/NORMAL	<__>	BI	~

Section:

LDP VIEW REQ'D	LDP AND M&C DISPLAY			
	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	<__>	<__>
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	[X]	[~]	<__>	HVAC_STATUS
[~]	X	[~]	<__>	<__>
~	~	~	~	~
[X]	X	[~]	< >	TEMP_P
[X]	X	[X]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	<__>	TEMP_P
[X]	X	[~]	< >	< >
[X]	X	[X]	< >	< >
[X]	X	[X]	< >	< >
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	[~]	~	<__>	<__>

LDP OVRD REQ'D	OVERRIDES			
	M&C OVRD REQ'D	SNVT NAME		
			SNVT TYPE	
~	~	~	~	
~	~	~	~	
~	~	~	~	
~	~	~	~	
~	[]	< >	< >	
~	~	~	~	
[~]	X	< >	< >	
SEE NOTES				
[~]	X	< >	< >	
~	~	~	~	
[~]	X	< >	< >	
~	~	~	~	
~	~	~	~	
[~]	X	< >	< >	
[X]	X	< >	< >	
[X]	X	< >	< >	
~	~	~	~	
~	~	~	~	
~	~	~	~	
~	~	~	~	
[~]	X	< >	< >	
[~]	X	< >	< >	
[~]	X	< >	< >	
~	~	~	~	
~	~	~	~	
~	~	~	~	
~	~	~	~	
[~]		~	[~]	
[ALM]		[info] [crit]	[]	

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
SUPPLY FAN PROOF FAILED	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
~	~	~
BLDG-T IS LESS THAN BLDG-T-LL	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[~]
[ALM]	[info] [crit]	[]

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 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT

SINGLE ZONE WITH DUAL TEMPERATURE COIL

NODE: <DDC##>
NODE LOCATION: <___>
NODE ADDRESS: Domain = <___>, Subnet = <___>, Node = <___>
NODE ID: <___>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF	<_>	BI	~
	DT-DA-T-LL	DUAL TEMP COIL DISCHARGE AIR TEMP LOW LIMIT SWITCH	[39 DEG F]	ALM/NORMAL	<_>	BI	~
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL	<_>	BI	~
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL	<_>	BI	~
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~	<_>	[_]	~
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	<_>	<_>	AI	~
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~	<_>	~	~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	<_>	<_>	NVI	~
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF	<_>	BO	[~]
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF	<___>	NVO	~
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED	<_>	BO	[~]
		MINIMUM OUTSIDE AIR FLOW SETTING	[_ CFM]	~	<_>		~
ZONE TEMPERATURE CONTROL: MA DAMPERS HEATING COIL COOLING COIL	OA-T	OUTSIDE AIR TEMPERATURE	~	<_>	<_>	AI	~
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN	<_>	AO	[~]
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[_]	~	<_>	~	~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[_]	~	<_>	~	~
		MIXED AIR PID LOOP SETTINGS	<_>	~	<___>	~	~
	DTWS-T	DUAL TEMP WATER SUPPLY TEMPERATURE	~	<_>	<_>	AI	~
	DTWS-T-SP	DUAL TEMP WATER SUPPLY TEMPERATURE SETPOINT	[_]	~	<_>	~	~
	ZN-T	ZONE TEMPERATURE	~	<___>	<___>	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	<_>	AI	~
	DT-V-C	DUAL TEMP COIL VALVE COMMAND	~	0-100% OPEN	<_>	AO	[~]
		DUAL TEMP COIL VALVE COOLING PID LOOP SETTINGS	<_>	~	<_>	~	~
		DUAL TEMP COIL VALVE HEATING PID LOOP SETTINGS	<_>	~	<_>	~	~
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	<_>	<___>	AI	~
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	<_>	ALM/NORMAL	<_>	BI	~

Section:

LDP VIEW REQ'D	LDP AND M&C DISPLAY			SNVT NAME	SNVT TYPE
	M&C DISP REQ'D	TREND REQ'D			
[X]	X	[~]	<_>		<_>
~	~	~	~		~
~	~	~	~		~
~	~	~	~		~
~	~	~	~		~
~	~	~	~		~
[~]	X	[~]	<_>	TEMP_P	
[~]	X	[~]	<_>		<_>
[X]	X	[~]	<_>		<_>
[X]	X	[~]	<_>		<_>
[~]	[X]	[~]	<___>	HVAC_STATUS	
[~]	X	[~]	<_>		<_>
~	~	~	~		~
[X]	X	[~]	<_>	TEMP_P	
[X]	X	[X]	<_>		<_>
[X]	X	[~]	<_>		<_>
[X]	X	[~]	<_>		<_>
~	~	~	~		~
[X]	X	[~]	<_>	TEMP_P	
[~]	X	[~]	<_>		<_>
[X]	X	X	<___>	TEMP_P	
[X]	X	X	<_>		<_>
[X]	X	[X]	<___>		<_>
~	~	~	~		~
~	~	~	~		~
[~]	X	[~]	<___>	TEMP_P	
[~]	[~]	~	<_>		<_>

LDP OVRD REQ'D	OVERRIDES		
	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	[_]	<_>	<_>
~	~	~	~
[~]	X	<_>	<_>
	SEE NOTES		
[~]	X	<_>	<_>
~	~	~	~
[~]	X	<_>	<_>
~	~	~	~
~	~	~	~
~	~	~	~
[~]	X	<_>	<_>
[X]	X	<_>	<_>
[X]	X	<_>	<_>
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
SUPPLY FAN PROOF FAILED	[info] [crit]	[_]
ALM	[info] [crit]	[_]
ALM	[info] [crit]	[_]
ALM	[info] [crit]	[_]
~	~	~
BLDG-T IS LESS THAN BLDG-T-LL	[info] [crit]	[_]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[_]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[_]
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[_]
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[~]
[ALM]	[info] [crit]	[_]

- Notes:
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 - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED
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SINGLE ZONE WITH HEATING AND COOLING COILS AND RETURN AIR BYPASS

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D	
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF	< >	BI	~	
	HTG-DA-T-LL	HEATING COIL DISCHARGE AIR TEMP LOW LIMIT SWITCH	[39 DEG F]	ALM/NORMAL	< >	BI	~	
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL	< >	BI	~	
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL	< >	BI	~	
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~	< >	[]	~	
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >	< >	AI	~	
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~	< >	~	~	
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >	< >	NVI	~	
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF	< >	BO	[~]	
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC COOL/ HVAC HEAT/ HVAC OFF	<__>	NVO	~	
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED	< >	BO	[~]	
		MINIMUM OUTSIDE AIR FLOW SETTING	[CFM]	~	< >		~	
ZONE TEMPERATURE CONTROL:	OA-T	OUTSIDE AIR TEMPERATURE	~	< >	< >	AI	~	
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]	
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[]	~	< >	~	~	
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[]	~	< >	~	~	
		MIXED AIR PID LOOP SETTINGS	< >	~	< >	~	~	
	MA DAMPERS	ZN-T	ZONE TEMPERATURE	~	< >	<__>	AI	~
	HEATING COIL	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	< >	AI	~
		HTG-V-C	HEATING COIL VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
	COOLING COIL	CLG-V-C-2P	COOLING COIL VALVE COMMAND (2-POS)	~	OPEN/CLOSED	< >	BO	[~]
		BA-D-C	BYPASS AIR DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
	BYPASS DAMPER		BYPASS AIR DAMPER PID LOOP SETTINGS	< >	~	< >	~	~
		HEATING COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~	
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	< >	< >	AI	~	
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL	< >	BI	~	
	BA-FLT-P-HL	BYPASS AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL	< >	BI	~	

Section:

LDP AND M&C DISPLAY					
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE	
	DISP REQ'D	TREND REQ'D			
[X]	X	[~]	< >	< >	
~	~	~	~	~	
~	~	~	~	~	
~	~	~	~	~	
[~]	X	[~]	< >	TEMP_P	
[~]	X	[~]	< >	< >	
[X]	X	[~]	< >	< >	
[X]	X	[~]	< >	< >	
[~]	[X]	[~]	< >	HVAC_STATUS	
[~]	X	[~]	< >	< >	
~	~	~	~	~	
[X]	X	[~]	< >	TEMP_P	
[X]	X	[X]	< >	< >	
[X]	X	[~]	< >	< >	
[X]	X	[~]	< >	< >	
~	~	~	~	~	
X	X	X	< >	TEMP_P	
X	X	X	< >	< >	
X	X	[X]	< >	< >	
X	X	[X]	< >	< >	
~	~	~	~	~	
~	~	~	~	~	
[~]	X	[~]	< >	TEMP_P	
[~]	[~]	~	< >	< >	
[~]	[~]	~	< >	< >	

[illegible]

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
SUPPLY FAN PROOF FAILED	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
~	~	~
BLDG-T IS LESS THAN BLDG-T-LL	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[~]
[ALM]	[info] [crit]	[]
[ALM]	[info] [crit]	[]

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- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
- 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
- 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULE.
- 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR 15 MINUTES.
- 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, OR CHILLER.

SINGLE ZONE WITH HUMIDITY CONTROL

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF	< >	BI	~
	PH-DA-T-LL	PREHEAT COIL DISCHARGE AIR TEMP LOW LIMIT SWITCH	[39 DEG F]	ALM/NORMAL	< >	BI	~
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~	< >	[]	~
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >	< >	AI	~
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~	< >	~	~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >	< >	NVI	~
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF	< >	BO	[~]
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF	<__>	NVO	~
OUTSIDE AIRFLOW	OA-D-2P	OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED	< >	BO	[~]
		OUTSIDE AIR FLOW SETTING	[] CFM]	~	< >		~
PREHEAT COIL CONTROL	PH-DA-T	PREHEAT COIL DISCHARGE AIR TEMPERATURE	~	<__>	<__>	AI	~
	PH-DA-T-SP	PREHEAT COIL DISCHARGE AIR TEMPERATURE SETPOINT	~	< >	< >	AO	[~]
	PH-V-C	PREHEAT COIL VALVE COMMAND	~	<0-100% OPEN>	< >	AO	[~]
		PREHEAT COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~
ZONE TEMPERATURE AND HUMIDITY CONTROL	ZN-T	ZONE TEMPERATURE	~	<__>	<__>	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	< >	AI	~
	ZN-RH	ZONE RELATIVE HUMIDITY	~	<0 - 100 % RH>	<__>	AI	~
	ZN-RH-SP	ZONE RELATIVE HUMIDITY SETPOINT	[]	~	< >	~	~
	SA-RH	SUPPLY AIR RELATIVE HUMIDITY	~	<0 - 100 % RH>	< >	AI	~
	SA-RH-SP	SUPPLY AIR RELATIVE HUMIDITY SETPOINT	80% RH	~	< >	~	~
	RH-V-C	REHEAT COIL VALVE COMMAND	~	<0-100% OPEN>	< >	AO	[~]
	CLG-V-C	COOLING COIL VALVE COMMAND	~	<0-100% OPEN>	< >	AO	[~]
	HUM-V-C	HUMIDIFIER VALVE COMMAND	~	<0-100% OPEN>	< >	AO	[~]
		COOLING COIL VALVE PID LOOP SETTINGS FOR RH CONTROL	< >	~	< >	~	~
		COOLING COIL VALVE PID LOOP SETTINGS FOR TEMP CONTR	< >	~	< >	~	~
		HEATING COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~
	HUMIDIFIER VALVE PID LOOP SETTINGS	< >	~	< >	~	~	
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	< >	< >	AI	~
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	[]	ALM/NORMAL	< >	BI	~
	OA-FLT-P-HL	OUTSIDE AIR FILTER PRESSURE HIGH LIMIT SWITCH	[]	ALM/NORMAL	< >	BI	~

Section:

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	[X]	[~]	< >	HVAC_STATUS
~	~	~	~	~
[~]	X	[~]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[X]	X	X	< >	TEMP_P
[X]	X	X	< >	< >
[X]	X	[X]	< >	< >
~	~	~	~	~
[X]	X	X	< >	TEMP_P
[X]	X	X	< >	< >
[X]	X	X	< >	TEMP_P
~	~	X	~	~
[X]	X	X	< >	< >
~	~	~	~	~
[X]	X	[X]	< >	< >
[X]	X	[X]	< >	< >
[X]	X	[X]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	[~]	~	< >	< >
[~]	[~]	~	< >	< >

[illegible]

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
SUPPLY FAN PROOF FAILED	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
~	~	~
BLDG-T IS LESS THAN BLDG-T-LL	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
PH-DA-T IS MORE THAN 34 DEG F BELOW PH-DA-T-SP	[info] [crit]	
~	~	~
~	~	~
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[]
~	~	~
** ZN-RH IS MORE THAN 10% ABOVE OR BELOW ZN-RH-SP	[info] [crit]	[]
~	~	~
SA-RH IS ABOVE 90% RH	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[~]
[ALM]	[info] [crit]	[]
[ALM]	[info] [crit]	[]

Notes:

- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
- 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
- 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULE.
- 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR 15 MINUTES.
- 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, OR CHILLER.

DUAL DUCT WITH RETURN FAN

NODE: <DDC##>
 NODE LOCATION: <__>
 NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
 NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF	< >	BI	~
	RF-S	RETURN FAN STATUS	~	ON/OFF	< >	BI	~
	MA-T-LL	MIXED AIR TEMPERATURE LOW LIMIT	[39 DEG F]	ALM/NORMAL	< >	BI	~
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~	< >	[]	~
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >	< >	AI	~
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~	< >	~	~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >	< >	NVI	~
	SF-SS	SUPPLY FAN START/STOP	~	START/STOP	< >	BO	[~]
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF	< >	NVO	~
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED	< >	BO	[~]
		MINIMUM OUTSIDE AIR FLOW SETTING	[CFM]	~	< >	~	~
MIXED AIR TEMPERATURE CONTROL WITH ECONOMIZER	OA-T	OUTSIDE AIR TEMPERATURE	~	< >	< >	AI	~
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
	MA-T	MIXED AIR TEMPERATURE	~	< >	< >	AI	~
	MA-T-SP	MIXED AIR TEMPERATURE SETPOINT	[]	~	< >	~	~
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[]	~	< >	~	~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[]	~	< >	~	~
HOT DECK CONTROL	HD-T	HOT DECK TEMPERATURE	~	< >	< >	AI	~
	HD-T-SP	HOT DECK TEMPERATURE SETPOINT	[RESET]	~	< >	~	~
	HD-V-C	HOT DECK VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
		HEATING COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~
COLD DECK CONTROL	CD-T	COLD DECK TEMPERATURE	~	< >	< >	AI	~
	CD-T-SP	COLD DECK TEMPERATURE SETPOINT	[]	~	< >	~	~
	CD-V-C	COLD DECK VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
		COOLING COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~
ZONE [1] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	< >	< >	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	< >	AI	~
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
		ZONE DAMPER PID LOOP SETTINGS	< >	~	< >	~	~
ZONE [2] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	< >	< >	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	< >	AI	~
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
		ZONE DAMPER PID LOOP SETTINGS	< >	~	< >	~	~
OTHER POINTS	RA-T	RETURN AIR TEMPERATURE	~	< >	< >	AI	~
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL	< >	BI	~

Section:

[illegible][illegible]

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
SUPPLY FAN PROOF FAILED	[info] [crit]	[]
SUPPLY FAN PROOF FAILED	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
~	~	~
BLDG-T IS LESS THAN BLDG-T-LL	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[]
~	~	~
[~]	~	[]
~	~	~
~	~	~
~	~	~
[~]	~	[]
~	~	~
~	~	~
~	~	~
[~]	~	[]
~	~	~
~	~	~
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[]
~	~	~
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
[~]	~	[~]
[ALM]	[info] [crit]	[]

Notes:

- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
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- 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, OR CHILLER.

MULTIZONE WITH RETURN FAN

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF	< >	BI	~
	RF-S	RETURN FAN STATUS		ON/OFF	< >	BI	~
	MA-T-LL	MIXED AIR TEMPERATURE LOW LIMIT	[39 DEG F]	ALM/NORMAL	< >	BI	~
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~	< >	[]	~
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >	< >	AI	~
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~	< >	~	~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)		< >	< >	NVI	~
	SF-SS	SUPPLY FAN START/STOP	~	START/STOP	< >	BO	[~]
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF	< >	NVO	~
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED	< >	BO	[~]
		MINIMUM OUTSIDE AIR FLOW SETTING	[CFM]	~	< >	~	~
MIXED AIR TEMPERATURE CONTROL WITH ECONOMIZER	OA-T	OUTSIDE AIR TEMPERATURE	~	< >	< >	AI	~
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
	MA-T	MIXED AIR TEMPERATURE	~	< >	< >	AI	~
	MA-T-SP	MIXED AIR TEMPERATURE SETPOINT	[]	~	< >	~	~
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[]	~	< >	~	~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[]	~	< >	~	~
		MIXED AIR DAMPER PID LOOP SETTINGS	< >	~	< >	~	~
HOT DECK CONTROL	HD-T	HOT DECK TEMPERATURE	~	< >	< >	AI	~
	HD-T-SP	HOT DECK TEMPERATURE SETPOINT	[RESET]	~	< >	~	~
	HD-V-C	HOT DECK VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
		HEATING COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~
COLD DECK CONTROL	CD-T	COLD DECK TEMPERATURE	~	< >	< >	AI	~
	CD-T-SP	COLD DECK TEMPERATURE SETPOINT	[]	~	< >	~	~
	CD-V-C	COLD DECK VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
		COOLING COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~
ZONE [1] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	< >	< >	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	< >	AI	~
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
		ZONE DAMPER PID LOOP SETTINGS	< >	~	< >	~	~
ZONE [2] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	< >	< >	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	< >	AI	~
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
		ZONE DAMPER PID LOOP SETTINGS	< >	~	< >	~	~
OTHER POINTS	RA-T	RETURN AIR TEMPERATURE	~	< >	< >	AI	~
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL	< >	BI	~

Section:

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	[X]	[~]	<__>	HVAC_STATUS
[~]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	< >	< >
[X]	X	[~]	< >	< >
[X]	X	X	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	< >	TEMP_P
[X]	X	X	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	< >	TEMP_P
[X]	X	X	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	<__>	TEMP_P
[X]	X	[X]	< >	< >
[X]	X	[X]	< >	< >
~	~	~	~	~
[X]	X	X	<__>	TEMP_P
[X]	X	[X]	< >	< >
[X]	X	[X]	< >	< >
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	[~]	~	< >	< >

[illegible]

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
SUPPLY FAN PROOF FAILED	[info] [crit]	[]
SUPPLY FAN PROOF FAILED	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
~	~	~
BLDG-T IS LESS THAN BLDG-T-LL	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[]
~	~	~
[~]	~	[]
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[]
~	~	~
~	~	~
~	~	~
[~]	~	[]
~	~	~
~	~	~
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[]
~	~	~
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
[~]	~	[~]
[ALM]	[info] [crit]	[]

Notes:

- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
- 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
- 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULE.
- 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR THE SPECIFIED DURATION.
- 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, OR CHILLER.

MULTIZONE WITH HOT DECK BYPASS WITH RETURN FAN

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF	< >	BI	~
	RF-S	RETURN FAN STATUS	~	ON/OFF	< >	BI	~
	MA-T-LL	MIXED AIR TEMPERATURE LOW LIMIT	[39 DEG F]	ALM/NORMAL	< >	BI	~
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL	< >	BI	~
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~	< >	[]	~
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >	< >	AI	~
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~	< >	~	~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >	< >	NVI	~
	SF-SS	SUPPLY FAN START/STOP	~	START/STOP	< >	BO	[~]
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF	<__>	NVO	~
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED	< >	BO	[~]
		MINIMUM OUTSIDE AIR FLOW SETTING	[] CFM	~	< >	~	~
MIXED AIR TEMPERATURE CONTROL WITH ECONOMIZER	OA-T	OUTSIDE AIR TEMPERATURE	~	< >	< >	AI	~
	OA-D-C	OUTSIDE AIR DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
	MA-T	MIXED AIR TEMPERATURE	~	< >	< >	AI	~
	MA-T-SP	MIXED AIR TEMPERATURE SETPOINT	[]	< >	< >	~	~
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[]	~	< >	~	~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[]	~	< >	~	~
		MIXED AIR DAMPER PID LOOP SETTINGS	< >	~	< >	~	~
COLD DECK CONTROL	CLG-DA-T	COOLING COIL DISCHARGE AIR TEMPERATURE	~	< >	< >	AI	~
	CLG-DA-T-SP	COOLING COIL DISCHARGE AIR TEMPERATURE SETPOINT	[]	~	< >	~	~
	CD-V-C	COLD DECK VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
		COOLING COIL VALVE PID LOOP SETTINGS	< >	~	< >	~	~
ZONE [1] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	<__>	<__>	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	< >	AI	~
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
		ZONE DAMPER PID LOOP SETTINGS	< >	~	< >	~	~
	ZN-V-C	ZONE HEATING VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
ZONE [2] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	<__>	<__>	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]	< >	AI	~
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN	< >	AO	[~]
		ZONE DAMPER PID LOOP SETTINGS	< >	~	< >	~	~
	ZN-V-C	ZONE HEATING VALVE COMMAND	~	0-100% OPEN	< >	AO	[~]
OTHER POINTS	RA-T	RETURN AIR TEMPERATURE	~	< >	< >	AI	~
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL	< >	BI	~

LDP VIEW REQ'D	LDP AND M&C DISPLAY			SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D	M&C		
[X]	X	[~]	< >	< >	
[X]	X	[~]	< >	< >	
~	~	~	~	~	
~	~	~	~	~	
~	~	~	~	~	
~	~	~	~	~	
~	~	~	~	~	
[~]	X	[~]	< >	TEMP_P	
[~]	X	[~]	< >	< >	
[X]	X	[~]	< >	< >	
[X]	X	[~]	< >	< >	
[~]	[X]	[~]	<__>	HVAC_STATUS	
[~]	X	[~]	< >	< >	
~	~	~	~	~	
[X]	X	X	< >	< >	
[X]	X	[~]	< >	< >	
[X]	X	X	< >	< >	
[X]	X	[~]	< >	< >	
[X]	X	[~]	< >	< >	
[X]	X	[~]	< >	< >	
~	~	~	~	~	
[X]	X	X	< >	TEMP_P	
[X]	X	X	< >	< >	
[~]	~	[~]	< >	< >	
~	~	~	~	~	
[X]	X	X	<__>	TEMP_P	
[X]	X	[~]	< >	< >	
[X]	X	[~]	< >	< >	
~	~	~	~	~	
[X]	X	[~]	< >	< >	
~	~	~	~	~	
[~]	X	[~]	< >	TEMP_P	
[~]	[~]	~	< >	< >	

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
[]	[]	< >	< >
~	~	~	~
[~]	X	< >	< >
SEE NOTES			
[~]	[~]	< >	< >
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
[~]	X	< >	< >
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
[~]	X	< >	< >
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
[~]	~	~	[~]
[ALM]	[info]	[crit]	[]

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
SUPPLY FAN PROOF FAILED	[info] [crit]	[]
SUPPLY FAN PROOF FAILED	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
ALM	[info] [crit]	[]
~	~	~
BLDG-T IS LESS THAN BLDG-T-LL	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	[~]
[ALM]	[info] [crit]	[]

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
 - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
 - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED M
 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT E

VAV [WITH][WITHOUT] RETURN FAN

NODE: <DOC#>
NODE LOCATION: <->
NODE ADDRESS: Domain = <->, Subnet = <->, Node = <->
NODE ID: <->

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	rptCPT NAME	ID TYPE	HOA REQD	VIEW REQD	DISP REQD	TREND REQD	SNVT NAME	SNVT TYPE	OVRD REQD	OVRD REQD	SNVT NAME	SNVT TYPE	ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	MAC ROUTING
PROOFS & SAFETIES	SE-S	SUPPLY FAN STATUS	-	ON/OFF	<->	B	-	[X]	X	[-]	<->	<->	-	-	-	-	SUPPLY FAN PROOF FAILED	[Hq][Gr]	[]
	RE-S	RETURN FAN STATUS	-	ON/OFF	<->	B	-	[X]	X	[-]	<->	<->	-	-	-	-	RETURN FAN PROOF FAILED	[Hq][Gr]	[]
	SA-SM	SUPPLY AIR SMOKE	-	AL/NORMAL	<->	B	-	-	-	-	-	-	-	-	-	-	ALM	[Hq][Gr]	[]
	RE-SM	RETURN AIR SMOKE	-	AL/NORMAL	<->	B	-	-	-	-	-	-	-	-	-	-	ALM	[Hq][Gr]	[]
	CLG-D-F-LL	COOLING COIL DISCHARGE AIR TEMP LOW LIMIT	99 DEG F	AL/NORMAL	<->	B	-	-	-	-	-	-	-	-	-	-	ALM	[Hq][Gr]	[]
	SE-P-HL	SUPPLY AIR PRESSURE HIGH LIMIT	[-] WIG	AL/NORMAL	<->	B	-	-	-	-	-	-	-	-	-	-	ALM	[Hq][Gr]	[]
	RS-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	-	<->	[]	-	-	-	-	-	-	-	-	-	-	-	ALM	[Hq][Gr]	[]
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	-	<->	<->	A	-	[-]	X	[-]	<->	TEMP_P	-	-	-	-	BLDG-T LESS THAN BLDG-T-LL	[Hq][Gr]	[]
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	(99 DEG F)	<->	<->	NW	-	[-]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	RS-OC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	-	<->	<->	NW	-	[-]	X	[-]	<->	<->	-	-	-	-	SEE NOTES	-	-
	SE-SS	SUPPLY FAN START/STOP	-	ON/OFF	<->	BO	[]	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	RE-SS	RETURN FAN START/STOP	-	ON/OFF	<->	BO	[]	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	-	HVAC COOL/ HVAC HEAT	<->	NWD	-	[-]	[X]	[-]	<->	HVAC STATUS	-	-	-	-	-	-	-
			<->	<->	<->	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUPPLY FAN CAPACITY CONTROL	SA-P	SUPPLY AIR PRESSURE	-	<->	<->	A	-	[X]	X	X	<->	<->	-	-	-	-	SA-P MORE THAN 20% ABOVE OR BELOW SA-P-SP	[Hq][Gr]	<->
	SA-P-SP	SUPPLY AIR PRESSURE SETPOINT	<->	<->	<->	AD	-	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	RE-S	SUPPLY FAN COMMAND	<->	0-100% OPEN	<->	AD	[]	[-]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
		SUPPLY FAN PID LOOP SETTINGS	<->	<->	<->	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RETURN FAN CAPACITY CONTROL	SA-F	SUPPLY AIR FLOW	-	B - CFM	<->	A	-	[X]	X	[-]	<->	<->	-	-	-	-	[-]	-	[]
	RE-F	RETURN AIR FLOW	-	B - CFM	<->	A	-	[X]	X	[-]	<->	<->	-	-	-	-	[-]	-	[]
	SA-F-SP	SUPPLY AIR FLOW SETPOINT	[-] CFM	<->	<->	AD	-	[-]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	RE-C	RETURN FAN COMMAND	<->	0-100% OPEN	<->	AD	[]	[-]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
MINIMUM OUTSIDE AIR	MINOA-F	MINIMUM OUTSIDE AIR FLOW	-	B - CFM	<->	A	-	[X]	X	X	<->	<->	-	-	-	-	MINOA-F LESS THAN 80% OF MINOA-F-SP	[Hq][Gr]	[]
	MINOA-F-SP	MINIMUM OUTSIDE AIR FLOW SETPOINT (SETTING)	[-] CFM	<->	<->	AD	-	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	MINOA-O-C	MINIMUM OUTSIDE AIR DAMPER COMMAND	<->	<->	<->	AD	[]	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
		MINIMUM OUTSIDE AIR DAMPER PID LOOP SETTINGS	<->	<->	<->	-	-	[-]	[-]	<->	<->	<->	-	-	-	-	-	-	-
			<->	<->	<->	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			<->	<->	<->	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MIXED AIR TEMPERATURE CONTROL WITH ECONOMIZER	OUT-T	OUTSIDE AIR TEMPERATURE	-	<->	<->	A	-	[X]	X	X	<->	<->	-	-	-	-	[-]	-	[]
	MIX-D-C	MIXED AIR DAMPER COMMAND	-	0-100% OPEN	<->	AD	[]	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	[]
	MIX-T	MIXED AIR TEMPERATURE	-	<->	<->	A	-	[X]	X	X	<->	<->	-	-	-	-	[-]	-	[]
	MIX-T-SP	MIXED AIR TEMPERATURE SETPOINT	[-]	<->	<->	-	-	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	ECON-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[-]	<->	<->	-	-	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	ECON-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[-]	<->	<->	-	-	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
		MIXED AIR DAMPER PID LOOP SETTINGS	<->	<->	<->	<->	-	-	-	-	-	-	-	-	-	-	-	-	-
SUPPLY AIR TEMPERATURE	SA-T	SUPPLY AIR TEMPERATURE	-	<->	<->	A	-	[X]	X	X	<->	TEMP_P	-	-	-	-	SA-T MORE THAN 10 DEG F ABOVE OR BELOW SETPOINT	[Hq][Gr]	[]
	SA-T-SP	SUPPLY AIR TEMPERATURE SETPOINT	(99 DEG F)	<->	<->	AD	-	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	CLV-V-C	COOLING VALVE COMMAND	<->	<->	<->	AD	[]	[X]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
		COOLING VALVE PID LOOP SETTINGS	<->	<->	<->	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OTHER POINTS	DA-T	RETURN AIR TEMPERATURE	-	<->	<->	A	-	[-]	X	[-]	<->	TEMP_P	-	-	-	-	[-]	-	[]
	DA-T-F-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	<->	AL/NORMAL	<->	B	-	[-]	X	[-]	<->	<->	-	-	-	-	TRUE	[Hq][Gr]	[]
	DA-T-F-LL	OUTSIDE AIR FILTER PRESSURE HIGH LIMIT SWITCH	<->	AL/NORMAL	<->	B	-	[-]	X	[-]	<->	<->	-	-	-	-	TRUE	[Hq][Gr]	[]
			<->	<->	<->	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE MAC SOFTWARE (FRONT END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXC

COOLING ONLY VAV BOX

NODE: <DOC#>
NODE LOCATION: <->
NODE ADDRESS: Domain = <->, Subnet = <->, Node = <->
NODE ID: <->

FUNCTION								LDP AND MAC DISPLAY				OVERRIDES				ALARMS			
FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	RPT/CPT NAME	ID TYPE	HOA REQD	LDP VIEW REQD	MAC DISP REQD	TREND REQD	SNVT NAME	SNVT TYPE	LDP OVRD REQD	MAC OVRD REQD	SNVT NAME	SNVT TYPE	ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	MAC ROUTING
PROOFS & SAFETIES	<->	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<->	AL/NORMAL	<->		-	-	-	-	-	-	-	-	-	-	ALM	[Hq][Gr]	[]
	<->	<UNIT MANUFACTURER'S SAFETY> (SEE NOTES)	<->	AL/NORMAL	<->		-	-	-	-	-	-	-	-	-	-	ALM	[Hq][Gr]	[]
START/STOP	SYS-OC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	-	<->	<->	NW	-	[-]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	ZN-OC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	-	<->	<->	B	-	[-]	X	[-]	<->	<->	-	-	-	-	-	-	-
	RE-OC	EFFECTIVE OCCUPANCY	-	OCCUNOCC	<->	NWD	-	[-]	X	[-]	<->	OCCUPANCY	-	-	-	-	-	-	-
	UNIT STATUS	UNIT STATUS (SEE NOTES)	-	HVAC HEAT/ HVAC OFF	<->	NWD	-	[-]	[X]	[-]	<->	HVAC STATUS	-	-	-	-	-	-	-
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE **	-	<->	<->	A	-	[-]	X	X	<->	TEMP_P	-	-	-	-	** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F	[Hq][Gr]	[]
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[68-77 DEG F]	<->	A	-	[-]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	ADJUSTABLE [18 DEG F]	<->	<->	-	-	[-]	[-]	[-]	<->	<->	[-]	[-]	<->	<->	-	-	-
	VAV-SA-F	VAV SUPPLY AIR FLOW	-	<->	<->	A	-	[-]	X	[-]	<->	<->	-	-	-	-	[-]	-	[]
	VAV-SA-F-SP	VAV SUPPLY AIR FLOW SETPOINT	RESET SCHED	<->	<->	AD	-	[-]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	VAV-D-C	VAV DAMPER COMMAND	<->	<->	<->	AD	-	[-]	[-]	[-]	<->	<->	[-]	X	<->	<->	-	-	-
	VAV-V-G	VAV REHEAT VALVE (HEAT ELEMENT) COMMAND	[99 DEG F]	<->	<->	AD	-	[-]	X	[-]	<->	<->	[-]	X	<->	<->	-	-	-
		ZONE TEMPERATURE SETPOINT DEMAND	<->	<->	<->	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		VAV DAMPER PID LOOP SETTINGS	<->	<->	<->	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		VAV VALVE PID LOOP SETTINGS	<->	<->	<->	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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VAV BOX WITH REHEAT

NODE: <DOC#>
NODE LOCATION: <->
NODE ADDRESS: Domain = <->, Subnet = <->, Node = <->
NODE ID: <->

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	rptCPT NAME	ID TYPE	HOA REQD	LDP AND MAC DISPLAY				OVERRIDES				ALARMS			
								LDP VIEW REQD	MAC DISP REQD	TREND REQD	SNVT NAME	SNVT TYPE	LDP OVRD REQD	MAC OVRD REQD	SNVT NAME	SNVT TYPE	ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	MAC ROUTING
PROOFS & SAFETIES	<->	<UNIT MANUFACTURERS PROOF> (SEE NOTES)	<->	AL/NORMAL	<->		-	-	-	-	-	-	-	-	-	-	ALM	[Info][Gr]	[]
	<->	<UNIT MANUFACTURERS SAFETY> (SEE NOTES)	<->	AL/NORMAL	<->		-	-	-	-	-	-	-	-	-	-	ALM	[Info][Gr]	[]
START/STOP	SYS-OC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	-	<->	<->	NW	-	[-]	X	[-]	<->	<->	-	-	-	-	SEE NOTES	-	-
	ZN-OC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	-	<->	<->	B	-	[-]	X	[-]	<->	<->	-	-	-	-	-	-	-
	RE-OC	EFFECTIVE OCCUPANCY	-	OCCUNOCC	<->	NWD	-	[-]	X	[-]	<->	OCCUPANCY	-	-	-	-	-	-	-
	UNIT STATUS	UNIT STATUS (SEE NOTES)	-	HVAC_HEAT HVAC_OFF	<->	NWD	-	[-]	[X]	[-]	<->	OCCUPANCY HVAC_STATUS	-	-	-	-	-	-	-
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE "	-	<->	<->	AI	-	[-]	X	X	<->	TEMP_P	-	-	-	-	" ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F	[Info][Gr]	[]
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	-	[68-77 DEG F]	<->	AI	-	[-]	X	[-]	<->	<->	-	-	X	<->	<->	-	-
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	-	OCCUPANT ADJUSTABLE	<->	AI	-	[-]	X	[-]	<->	<->	-	-	X	<->	<->	-	-
	WV-S-FL	WV SUPPLY AIR FLOW	-	[0-100%]	<->	AI	-	[-]	[-]	[-]	<->	<->	-	-	[-]	[-]	[-]	-	-
	WV-S-FL-SP	WV SUPPLY AIR FLOW SETPOINT	-	RESET_SCHED	<->	AI	-	[-]	[-]	[-]	<->	<->	-	-	X	<->	<->	-	-
	WV-D-C	WV DAMPER COMMAND	-	<0-100% OPEN>	<->	AO	-	[-]	[-]	[-]	<->	<->	-	-	X	<->	<->	-	-
	WV-V-C	WV -REHEAT VALVE-HEAT ELEMENT- COMMAND	-	<0-100% OPEN>	<->	AO	-	[-]	X	[-]	<->	<->	-	-	[-]	[-]	[-]	-	-
	WV-T-SP	ZONE TEMPERATURE SETPOINT (DISABLER)	-	[68-77 DEG F]	<->	AI	-	[-]	X	[-]	<->	<->	-	-	X	<->	<->	-	-
OTHER POINTS	WV-Da-T	WV DISCHARGE AIR TEMPERATURE	-	<->	<->	AI	-	[-]	X	X	<->	TEMP_P	-	-	-	-	[-]	-	[]

UNIT HEATER AND CABINET UNIT HEATER

NODE: <DDC#>
NODE LOCATION: <_>
NODE ADDRESS: Domain = <_>, Subnet = <_>, Node = <_>
NODE ID: <_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	<_>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<_>	ALMNORMAL	<->		~
	<_>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES)	<_>	ALMNORMAL	<->		~
START/STOP	SYS-OC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	OCCUNOCC	<->	NVI	~
	ZN-OC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	OCCUNOCC	<->	BI	~
	EFF-OC	EFFECTIVE OCCUPANCY	~	OCCUNOCC	<->	NVO	~
	OFF/AUTO	UNIT OFF/AUTO SWITCH	~	<->	BI	~	~
	UNIT STATUS	UNIT STATUS (SEE NOTES)	~	HVAC_HEAT/ HVAC_OFF	<->	NVO	~
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE **	~	<->	<->	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[88-77 DEG F]	<->	AI	~
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[82 DEG F]	~	<->	~	~
	HTG-V-C	HEATING VALVE COMMAND	~	0-100% OPEN	<->	AO	~
	SP-SS	SUPPLY FAN START/STOP	~	[OFF LO MED HI]	<->	BO	~
		HEATING VALVE PID LOOP SETTINGS	<->	<->	<->	~	~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C DISP REQ'D	TREND REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~	~
[~]	X	[~]	<->	<->
[~]	[~]	[~]	<->	<->
[~]	X	[~]	<->	OCCUPANCY
[~]	[~]	[~]	<->	<->
[~]	X	[~]	<->	HVAC_STATUS
[~]	X	X	<->	TEMP_P
[~]	X	[~]	<->	<->
[~]	[~]	[~]	<->	<->
[~]	X	X	<->	<->
[~]	X	[~]	<->	<->
~	~	~	~	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
SEE NOTES			
~	~	~	~
~	~	~	~
~	[~]	<->	<->
~	~	~	~
~	~	~	~
[~]	X	<->	<->
[~]	[~]	<->	<->
[~]	X	~	~
[~]	X	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
~	~	[]
ALM	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
 - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - 3) SYS-OC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS. OVERRIDE OF SYS-OC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
 - 4) ALARM CONDITIONS MARKED WITH A DOUBLE ASTERISK (**) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN 30 MINUTES.
 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

GAS-FIRED INFRARED HEATER

NODE: <DDC#>
NODE LOCATION: <_>
NODE ADDRESS: Domain = <_>, Subnet = <_>, Node = <_>
NODE ID: <_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	<_>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<_>	ALMNORMAL	<->		~
	<_>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES)	<_>	ALMNORMAL	<->		~
	ZN-OC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	OCCUNOCC	<->	BI	~
	EFF-OC	EFFECTIVE OCCUPANCY	~	OCCUNOCC	<->	NVO	~
	ON / OFF / AUTO	UNIT OFF / AUTO SWITCH	~	<->	BI	~	~
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE **	~	<->	<->	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[88-77 DEG F]	<->	AI	~
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[82 DEG F]	~	<->	~	~
	HTG-V-C	HEATING VALVE COMMAND	~	ON/OFF	<->	BO	~
		INFRARED HEATER ON/OFF COMMAND	~	<->	<->	BO	~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C DISP REQ'D	TREND REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~	~
[~]	[~]	[~]	<->	<->
[~]	X	[~]	<->	OCCUPANCY
[~]	[~]	[~]	<->	<->
[~]	X	X	<->	TEMP_P
[~]	X	[~]	<->	<->
[~]	[~]	[~]	<->	<->
[~]	X	[~]	<->	<->
~	~	~	~	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
SEE NOTES			
~	~	~	~
~	~	~	~
~	[~]	<->	<->
~	~	~	~
~	~	~	~
[~]	X	<->	<->
[~]	[~]	<->	<->
[~]	X	~	~
[~]	X	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
~	~	[]
ALM	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
 - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - 3) SYS-OC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS. OVERRIDE OF SYS-OC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
 - 4) ALARM CONDITIONS MARKED WITH A DOUBLE ASTERISK (**) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN 30 MINUTES.
 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

PERIMETER RADIATION

NODE: <DDC#>
NODE LOCATION: <_>
NODE ADDRESS: Domain = <_>, Subnet = <_>, Node = <_>
NODE ID: <_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	<_>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<_>	ALMNORMAL	<->		~
	<_>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES)	<_>	ALMNORMAL	<->		~
START/STOP	SYS-OC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	OCCUNOCC	<->	NVI	~
	ZN-OC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	OCCUNOCC	<->	BI	~
	EFF-OC	EFFECTIVE OCCUPANCY	~	OCCUNOCC	<->	NVO	~
	UNIT STATUS	UNIT STATUS (SEE NOTES)	~	HVAC_HEAT/ HVAC_OFF	<->	NVO	~
			~		<->		~
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE **	~	<->	<->	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[88-77 DEG F]	<->	AI	~
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[82 DEG F]	~	<->	~	~
	HTG-V-C	HEATING VALVE COMMAND	~	<0-100% OPEN>	<->	AO	~
		HEATING VALVE PID LOOP SETTINGS	<->	<->	<->	~	~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C DISP REQ'D	TREND REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~	~
[~]	X	[~]	<->	<->
[~]	[~]	[~]	<->	<->
[~]	X	[~]	<->	OCCUPANCY
[~]	[X]	[~]	<->	HVAC_STATUS
[~]	X	X	<->	TEMP_P
[~]	X	[~]	<->	<->
[~]	[~]	[~]	<->	<->
[~]	X	X	<->	<->
[~]	X	[~]	<->	<->
~	~	~	~	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
SEE NOTES			
~	~	~	~
[~]	~	~	~
~	~	~	~
~	~	~	~
[~]	X	<->	<->
[~]	[~]	<->	<->
[~]	X	~	~
[~]	X	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
~	~	[]
ALM	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
 - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - 3) SYS-OC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS. OVERRIDE OF SYS-OC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
 - 4) ALARM CONDITIONS MARKED WITH A DOUBLE ASTERISK (**) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN 30 MINUTES.
 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

DUAL TEMPERATURE FAN COIL UNIT

NODE: <DDC#>
NODE LOCATION: <_>
NODE ADDRESS: Domain = <_>, Subnet = <_>, Node = <_>
NODE ID: <_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	<_>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<_>	ALMNORMAL	<->		~
	<_>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES)	<_>	ALMNORMAL	<->		~
START/STOP	SYS-OC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	OCCUNOCC	<->	NVI	~
	ZN-OC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	OCCUNOCC	<->	BI	~
	EFF-OC	EFFECTIVE OCCUPANCY	~	OCCUNOCC	<->	NVO	~
	UNIT STATUS	UNIT STATUS (SEE NOTES)	~	HVAC_HEAT/ HVAC_OFF	<->	NVO	~
			~		<->		~
ZONE TEMPERATURE CONTROL	DTWS-T	DUAL TEMP WATER SUPPLY TEMPERATURE	~	<->	<->	<Ab>	~
	DTWS-T-SP	DUAL TEMP WATER SUPPLY TEMPERATURE SETPOINT	~	<->	<Ab>	<Ab>	~
	ZN-T	ZONE TEMPERATURE **	~	<->	<->	AI	~
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[88-77 DEG F]	<->	AI	~
	ZN-T-SP-HTG-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[60 DEG F]	~	<->	~	~
	ZN-T-SP-CLG-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[82 DEG F]	~	<->	~	~
	DT-V-C	DUAL TEMP VALVE COMMAND	~	<0-100% OPEN>	<->	AO	~
	OFF/AUTO	UNIT OFF/AUTO SWITCH	~	OFF/AUTO	<->	BI	~
	SP-SS	SUPPLY FAN START/STOP	~	[OFF LO MED HI]	<->	BO	~
		DUAL TEMP VALVE PID LOOP SETTINGS	~	~	<->	~	~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C DISP REQ'D	TREND REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~	~
[~]	~	~	~	~
[~]	X	[~]	<->	<->
[~]	[~]	[~]	<->	<->
[~]	X	[~]	<->	OCCUPANCY
[~]	[X]	[~]	<->	HVAC_STATUS
[~]	X	X	<->	<->
[~]	X	X	<->	<->
[~]	X	X	<->	TEMP_P
[~]	X	[~]	<->	<->
[~]	[~]	[~]	<->	<->
[~]	[~]	[~]	<->	<->
[~]	X	X	<->	<->
[~]	~	~	<->	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
SEE NOTES			
~	~	~	~
[~]	~	~	~
~	~	~	~
~	~	~	~
[~]	X	<->	<->
[~]	[~]	<->	<->
[~]	X	~	~
[~]	X	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
~	~	[]
ALM	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F	[info] [crit]	[]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
 - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - 3) SYS-OC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS. OVERRIDE OF SYS-OC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
 - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: * = 5 MINUTES ** = 30 MINUTES
 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOL

HYDRONIC HEATING HOT WATER FROM DISTRIBUTED STEAM CONVERTER

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: < __ >

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	HW-PMP-S	HOT WATER PUMP STATUS	~	ON/OFF	< __ >		~
START/STOP	SYS-ENA	SYSTEM ENABLE	~	ENABLE/DISABLE	< __ >	<NVI>	~
	HW-PMP-SS	HOT WATER PUMP START/STOP	~	START/STOP	< __ >	BO	[~]
	UNIT STATUS	HEATING MODE UNIT STATUS (SEE NOTES)	~	ON/OFF	< __ >	NVO	~
HEAT EXCHANGER VALVE CONTROL (STEAM)	OA-T	OUTSIDE AIR TEMPERATURE	~	< __ >	< __ >	AI	~
	HWS-T	HOT WATER SUPPLY TEMPERATURE	~	< __ >	< __ >	AI	~
	HWS-T-SP	HOT WATER SUPPLY TEMPERATURE SETPOINT	[RESET]	~	< __ >	~	~
	STM-V-C	STEAM VALVE COMMAND	~	0-100% OPEN	< __ >	AO	[~]
		STEAM VALVE PID LOOP SETTINGS	< __ >	~	< __ >	~	~
SYSTEMS SERVED	HTG-RQST1	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF	< __ >	NVI	~
	HTG-RQST2	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF	< __ >	NVI	~
OTHER POINTS	HWR-T	HOT WATER RETURN TEMPERATURE	~	< __ >	< __ >	AI	~

LDP VIEW REQ'D	LDP AND M&C DISPLAY		SNVT NAME	SNVT TYPE
	M&C DISP REQ'D	TREND REQ'D		
[X]	X	[~]	< __ >	< __ >
[X]	[X]	[~]	< __ >	< __ >
[~]	[~]	[~]	< __ >	< __ >
~	[X]	[~]	< __ >	< __ >
[X]	X	[~]	< __ >	< __ >
[X]	X	X	< __ >	< __ >
[X]	X	[X]	< __ >	< __ >
~	~	~	~	~
~	X	~	< __ >	HVAC_STATUS
~	X	~	< __ >	HVAC_STATUS
[X]	X	[~]	< __ >	< __ >

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
			< __ >
[~]	X	< __ >	< __ >
[~]	X	< __ >	< __ >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
~	~	[__]
~	~	~
~	~	~
~	~	[~]
~	~	~
HWS-T MORE THAN 41 DEG F ABOVE OR BELOW HWS-T-SP	[info] [crit]	[__]
~	~	~
~	~	[~]
~	~	~
~	~	~
~	~	~
[~]	~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
 - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
 - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE
 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCH

HYDRONIC HEATING HOT WATER FROM DISTRIBUTED HTHW CONVERTER

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: < __ >

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	HW-PMP-S	HOT WATER PUMP STATUS	~	ON/OFF	< __ >		~
START/STOP	SYS-ENA	SYSTEM ENABLE	~	ENABLE/DISABLE	< __ >	<NVI>	~
	HW-PMP-SS	HOT WATER PUMP START/STOP	~	START/STOP	< __ >	BO	[~]
	UNIT STATUS	HEATING MODE UNIT STATUS (SEE NOTES)	~	ON/OFF	< __ >	NVO	~
HEAT EXCHANGER VALVE CONTROL (STEAM)	OA-T	OUTSIDE AIR TEMPERATURE	~	< __ >	< __ >	AI	~
	HWS-T	HOT WATER SUPPLY TEMPERATURE	~	< __ >	< __ >	AI	~
	HWS-T-SP	HOT WATER SUPPLY TEMPERATURE SETPOINT	[RESET]	~	< __ >	~	~
	HTHW-V-C	HTHW VALVE COMMAND	~	0-100% OPEN	< __ >	AO	[~]
		HTHW VALVE PID LOOP SETTINGS	< __ >	~	< __ >	~	~
SYSTEMS SERVED	HTG-RQST1	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF	< __ >	NVI	~
	HTG-RQST2	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF	< __ >	NVI	~
OTHER POINTS	HWR-T	HOT WATER RETURN TEMPERATURE	~	< __ >	< __ >	AI	~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	< __ >	< __ >
[X]	[X]	[~]	< __ >	< __ >
[~]	[~]	[~]	< __ >	< __ >
~	[X]	[~]	< __ >	< __ >
[X]	X	[~]	< __ >	< __ >
[X]	X	X	< __ >	< __ >
[X]	X	[X]	< __ >	< __ >
~	~	~	~	~
~	X	~	< __ >	HVAC_STATUS
~	X	~	< __ >	HVAC_STATUS
[X]	X	[~]	< __ >	< __ >

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
			< __ >
[~]	X	< __ >	< __ >
[~]	X	< __ >	< __ >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
~	~	[__]
~	~	~
~	~	~
~	~	[~]
~	~	~
HWS-T MORE THAN 41 DEG F ABOVE OR BELOW HWS-T-SP	[info] [crit]	[__]
~	~	~
~	~	[~]
~	~	~
~	~	~
~	~	~
[~]	~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
 - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
 - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE
 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCH.

HYDRONIC HEATING HOT WATER FROM SINGLE BUILDING BOILER

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	HW-PMP-S	HOT WATER PUMP STATUS	~	ON/OFF	<__>		~
START/STOP	SYS-ENA	SYSTEM ENABLE	~	ENABLE/DISABLE	<__>	<NVI>	~
	HW-PMP-SS	HOT WATER PUMP START/STOP	~	START/STOP	<__>	BO	[~]
	UNIT STATUS	HEATING MODE UNIT STATUS (SEE NOTES)	~	ON/OFF	<__>	NVO	
HOT WATER TEMPERATURE CONTROL	OA-T	OUTSIDE AIR TEMPERATURE	~	<__>	<__>	AI	~
	HWS-T	HOT WATER SUPPLY TEMPERATURE	~	<__>	<__>	AI	~
	HWS-T-SP	HOT WATER SUPPLY TEMPERATURE SETPOINT	[RESET]	~	<__>	~	~
	HW-V-C	HOT WATER VALVE COMMAND	~	0-100% OPEN	<__>	AO	[~]
		HOT WATER VALVE PID LOOP SETTINGS	<__>	~	<__>	~	~
SYSTEMS SERVED	HTG-RQST1	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF	<__>	NVI	~
	HTG-RQST2	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF	<__>	NVI	~
OTHER POINTS	HWR-T	HOT WATER RETURN TEMPERATURE	~	<__>	<__>	AI	~
	BLR-S	BOILER STATUS (STATE)	~	START/STOP	<__>	<BI>	~

Section:

LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	<__>	<__>
[X]	[X]	[~]	<__>	<__>
[~]	[~]	[~]	<__>	<__>
~	[X]	[~]	<__>	<__>
[X]	X	[~]	<__>	<__>
[X]	X	X	<__>	<__>
[X]	X	[X]	<__>	<__>
~	~	~	~	~
~	X	~	<__>	HVAC_STATUS
~	X	~	<__>	HVAC_STATUS
[X]	X	[~]	<__>	<__>
[X]	X	[X]	<__>	<__>

LDP OVRD REQ'D	M&C OVRD REQ'D	OVERRIDES	
		SNVT NAME	SNVT TYPE
~	~	~	~
			<__>
[~]	X	<__>	<__>
[~]	X	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
~	~	[__]
~	~	~
~	~	~
~	~	[~]
~	~	~
HWS-T MORE THAN 41 DEG F ABOVE OR BELOW HWS-T-SP	[info] [crit]	[__]
~	~	~
~	~	[~]
~	~	~
~	~	~
~	~	~
[~]	~	~
~	~	~

- Notes:
- THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
 - UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
 - ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE
 - UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCH

HYDRONIC DUAL-TEMPERATURE SYSTEM WITH STEAM HEAT EXCHANGER AND CHILLED WATER

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	HX-P-LL	HEAT EXCHANGER DIFFERENTIAL PRESSURE LOW LIMIT	~	FLOW/NO FLOW	<__>	BI	~
	DT-PMP-S	DUAL TEMP PUMP STATUS	~	ON/OFF	<__>	~	~
START/STOP	SYS-ENA	SYSTEM ENABLE	~	ENABLE/DISABLE	<__>	<NVI>	~
	HTG/COOL-MOD	HEATING/COOLING MODE SWITCH	~	HEAT/COOL	<__>	BI	~
	DT-PMP-SS	DUAL TEMP PUMP START/STOP COMMAND	~	START/STOP	<__>	BO	[~]
	UNIT STATUS	HEATING MODE UNIT STATUS (SEE NOTES)	~	ON/OFF	<__>	NVO	~
DUAL TEMP SWITCHOVER	DTWR-T	DUAL-TEMP WATER RETURN TEMPERATURE	~	<__>	<__>	AI	~
	DTWR-T-LL	DUAL-TEMP WATER RETURN TEMPERATURE LOW LIMIT	65 DEG F	~	<__>	~	~
	DTWR-T-HL	DUAL-TEMP WATER RETURN TEMPERATURE HIGH LIMIT	85 DEG F	~	<__>	~	~
	DT-V-2P	DUAL-TEMP SWITCHOVER VALVE	~	HEAT/COOL	<__>	BO	[~]
	CHLR-ENA	CHILLER ENABLE	~	ENABLE/DISABLE	<__>	BO	[~]
HEAT EXCHANGER VALVE CONTROL (STEAM)	OA-T	OUTSIDE AIR TEMPERATURE	~	<__>	<__>	AI	~
	HWS-T	HOT WATER SUPPLY TEMPERATURE	~	<__>	<__>	AI	~
	HWS-T-SP	HOT WATER SUPPLY TEMPERATURE SETPOINT	[RESET]	~	<__>	~	~
	STM-V-C	STEAM VALVE COMMAND	~	0-100% OPEN	<__>	AO	[~]
		STEAM VALVE PID LOOP SETTINGS	<__>	~	<__>	~	~
SYSTEMS SERVED	HTG-RQST1	HTG RQST FROM: AHU [____], BUILDING [____]	~	HVAC_HEAT/ HVAC_OFF	<__>	NVI	~
	HTG-RQST2	HTG RQST FROM: AHU [____], BUILDING [____]	~	HVAC_HEAT/ HVAC_OFF	<__>	NVI	~
OTHER POINTS	HWR-T	HOT WATER RETURN TEMPERATURE	~	<__>	<__>	AI	~
	DTWS-T	DUAL-TEMP WATER SUPPLY TEMPERATURE	~	<__>	<__>	AI	~

LDP VIEW REQ'D	LDP AND M&C DISPLAY		SNVT NAME	SNVT TYPE
	M&C DISP REQ'D	TREND REQ'D		
[~]	X	[~]	<__>	<__>
[~]	X	[~]	<__>	<__>
[X]	X	[~]	<__>	<__>
[~]	X	[~]	<__>	<__>
[~]	[~]	[~]	<__>	<__>
~	[X]	[~]	<__>	<__>
[~]	X	[~]	<__>	<__>
[~]	[~]	[~]	<__>	<__>
[~]	[~]	[~]	<__>	<__>
[~]	X	[~]	<__>	<__>
[~]	X	[~]	<__>	<__>
[X]	X	[~]	<__>	<__>
[X]	X	X	<__>	<__>
[X]	X	X	<__>	<__>
[X]	X	[X]	<__>	<__>
~	~	~	~	~
~	X	~	<__>	HVAC_STATUS
~	X	~	<__>	HVAC_STATUS
[X]	X	[~]	<__>	<__>
[X]	X	[~]	<__>	<__>

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
[~]	X	<__>	<__>
[~]	X	<__>	<__>
[~]	X	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
[~]	X	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
[~]	X	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
* HWS FLOW PROOF FAILED	[info] [crit]	[____]
~	~	[____]
~	~	~
~	~	~
~	~	~
~	~	[~]
~	~	~
[~]	~	[~]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
DTWS-T MORE THAN 41 DEG F ABOVE OR BELOW DTWS-T-SP	[info] [crit]	[____]
~	~	~
~	~	[~]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	~
[~]	~	~

- Notes:
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 - UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCH.

HYDRONIC DUAL-TEMPERATURE SYSTEM WITH HIGH TEMPERATURE HOT WATER HEAT EXCHANGER AND CHILLED WATER

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: <__>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
PROOFS & SAFETIES	HX-P-LL	HEAT EXCHANGER DIFFERENTIAL PRESSURE LOW LIMIT	~	FLOW/NO FLOW	< >	BI	~
	DT-PMP-S	DUAL TEMP PUMP STATUS	~	ON/OFF	< >	~	~
START/STOP	SYS-ENA	SYSTEM ENABLE	~	ENABLE/DISABLE	< >	<NVI>	~
	HTG/COOL-MOD	HEATING/COOLING MODE SWITCH	~	HEAT/COOL	< >	BI	~
	DT-PMP-SS	DUAL TEMP PUMP START/STOP COMMAND	~	START/STOP	< >	BO	[~]
	UNIT STATUS	HEATING MODE UNIT STATUS (SEE NOTES)	~	ON/OFF	< >	NVO	~
DUAL TEMP SWITCHOVER	DTWR-T	DUAL-TEMP WATER RETURN TEMPERATURE	~	< >	< >	AI	~
	DTWR-T-LL	DUAL-TEMP WATER RETURN TEMPERATURE LOW LIMIT	65 DEG F	~	< >	~	~
	DTWR-T-HL	DUAL-TEMP WATER RETURN TEMPERATURE HIGH LIMIT	85 DEG F	~	< >	~	~
	DT-V-2P	DUAL-TEMP SWITCHOVER VALVE	~	HEAT/COOL	< >	BO	[~]
	CHLR-ENA	CHILLER ENABLE	~	ENABLE/DISABLE	< >	BO	[~]
HEAT EXCHANGER VALVE CONTROL (HTHW)	OA-T	OUTSIDE AIR TEMPERATURE	~	< >	< >	AI	~
	HWS-T	HOT WATER SUPPLY TEMPERATURE	~	<__>	<__>	AI	~
	HWS-T-SP	HOT WATER SUPPLY TEMPERATURE SETPOINT	[RESET]	~	<__>	~	~
	HTHW-V-C	HTHW VALVE COMMAND	~	0-100% OPEN	<__>	AO	[~]
		HTHW VALVE PID LOOP SETTINGS	< >	~	< >	~	~
SYSTEMS SERVED	HTG-RQST1	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF	<__>	NVI	~
	HTG-RQST2	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF	<__>	NVI	~
OTHER POINTS	HWR-T	HOT WATER RETURN TEMPERATURE	~	< >	< >	AI	~
	DTWS-T	DUAL-TEMP WATER SUPPLY TEMPERATURE	~	< >	< >	AI	~

LDP VIEW REQ'D	LDP AND M&C DISPLAY		SNVT NAME	SNVT TYPE
	M&C DISP REQ'D	TREND REQ'D		
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
[~]	[~]	[~]	< >	< >
~	[X]	[~]	< >	< >
[~]	X	[~]	< >	< >
[~]	[~]	[~]	< >	< >
[~]	[~]	[~]	< >	< >
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	X	<__>	<__>
[X]	X	X	<__>	<__>
[X]	X	[X]	< >	< >
~	~	~	~	~
~	X	~	<__>	HVAC_STATUS
~	X	~	<__>	HVAC_STATUS
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
[~]	X	< >	< >
[~]	X	< >	< >
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
[~]	X	<__>	<__>
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
* HWS FLOW PROOF FAILED	[info] [crit]	[__]
~	~	[__]
~	~	~
~	~	~
~	~	~
~	~	[~]
~	~	~
[~]	~	[~]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
DTWS-T MORE THAN 41 DEG F ABOVE OR BELOW DTWS-T-SP	[info] [crit]	[__]
~	~	~
~	~	[~]
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
~	~	~
[~]	~	~
[~]	~	~

- Notes:
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 - UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
 - ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: * = 5 MINUTES ** = 30 MINUTES
 - UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

HYDRONIC SECONDARY WITH CONSTANT SPEED PUMPING

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: < __>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
START/STOP	SYS-ENA	SYSTEM ENABLE	~	~	< >	<NVI>	~
	SEC-PMP-SS	CHILLED WATER PUMP START/STOP	~	START/STOP	< >	BO	[~]
	SEC-PMP-S	CHILLED WATER PUMP STATUS	~	ON/OFF	< >	BI	~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT	
		NAME	TYPE
[~]	[~]	< >	< >
[~]	[~]	< >	< >
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
~	~	~
~	~	~
~	~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
 - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
 - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
 - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: * = 5 MINUTES ** = 30 MINUTES
 - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

Section:

SECONDARY HYDRONIC WITH VARIABLE SPEED PUMPING

NODE: <DDC##>
NODE LOCATION: <__>
NODE ADDRESS: Domain = <__>, Subnet = <__>, Node = <__>
NODE ID: < __ >

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE	HOA REQ'D
START/STOP	SYS-ENA	SYSTEM ENABLE	~	~	< __ >	<NVI>	~
	SEC-PMP-SS	CHILLED WATER PUMP START/STOP	~	START/STOP	< __ >	BO	[~]
	SEC-PMP-S	CHILLED WATER PUMP STATUS	~	ON/OFF	< __ >	BI	~
PRESSURE CONTROL	SEC-PMP-C	CHILLED WATER VFD PUMP SPEED COMMAND	~	<0-100%>	< __ >	AO	[~]
	SEC-P	CHILLED WATER SUPPLY PRESSURE	~	<__>	<__>	AI	~
	SEC-P-SP	CHILLED WATER SUPPLY PRESSURE SETPOINT	[__]	~	<__>	~	~
		CHILLED WATER PUMP PID LOOP SETTINGS	< __ >	~	< __ >	~	~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[~]	X	[~]	< __ >	< __ >
[~]	X	[~]	< __ >	< __ >
[~]	X	[~]	< __ >	< __ >
[~]	X	[~]	< __ >	< __ >
~	[~]	[~]	<__>	<__>
[~]	[~]	[~]	<__>	<__>
~	~	~	~	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
[~]	[~]	< __ >	< __ >
[~]	[~]	< __ >	< __ >
~	~	~	~
[~]	[~]	< __ >	< __ >
~	~	~	~
[~]	X	<__>	<__>
~	~	~	~

ALARMS		
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING
~	~	~
~	~	~
~	~	~
	~	
[~]	~	[~]
* CWS-P MORE THAN 25% ABOVE OR BELOW CWS-P-SP	[info] [crit]	[__]
~	~	~
~	~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.

2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.

3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.

4) ALARM CONDITIONS MARKED WITH AN ASTERISK (*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: * = 5 MINUTES ** = 30 MINUTES

5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

Section:

Appendix DD

PROJECT SPECIFIC REQUIREMENTS

1. Employee Parking

Contractor employees shall park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking shall not interfere with existing and established parking requirements of the military installation.

2. AVAILABILITY AND USE OF UTILITY SERVICES

a. Payment for Utility Services

All temporary utility connections and services for site trailers, field offices, construction power, etc., shall be at the Contractor's expense. The utility usage during construction, and until the time of beneficial occupancy by the Government, shall be paid for by the Contractor at the prevailing rates charged by the Government, or where the utility is produced by the Government, at reasonable rates as determined by the Contracting Officer. The Contractor shall carefully conserve utilities, if any, that are furnished without charge. The Contractor shall establish a Utilities Sales Agreement with the DPW Energy Branch 15 working days before final connection of any utility is desired. Contractor must contact the DPW Energy Branch at 573-596-0645 with the following information to establish a utility sales contract:

- a. Company Name
- b. POC on-site
- c. POC for signing contract (must be an authorized person to sign a legal document on behalf of the company.
- d. Company Address
- e. Company Phone Number
- f. On-site Phone Number
- g. E-mail Address
- h. Location of Work

Once contract is signed the DPW Energy Branch will email the utility company with authorization to provide utilities to your company.

3. Meters and Temporary Connections

a. When a utility is serviced from a Government-owned utility distribution system, the Contractor, at its expense and in a manner satisfactory to the Contracting Officer, shall provide and maintain all necessary temporary connections, distribution lines, and distribution equipment, and all meter assemblies required to measure the amount of each utility used for the purpose of determining charges. The Contractor shall provide the Contracting Officer a detailed utility connection and metering plan for approval a minimum of 5 working days prior to the desired utility connection. The Government will approve the Contractor's installation for connection after inspection. After receiving approval, the Contractor shall make the final utility connection.

b. When a utility is serviced from a non-Government-owned utility distribution system, the Contractor shall notify the Contracting Officer in writing of the utility requirement so that service can be coordinated through the DPW Operations Branch with the appropriate utility service provider. The utility service connection charge, to include any required distribution lines, distribution equipment, and meter assemblies, shall be at the Contractor's expense. The Contractor shall not install any utility distribution system components for, nor make any connections to, a non-Government utility system.

c. The water and waste-water distribution systems are currently Government owned, with the privatization of these utility systems to a non-Government entity pending the final decision of the solicitation that is currently being conducted. The natural gas and electrical distribution systems are non-Government owned.

d. All temporary electrical services from the electrical utility distribution system, to and including the meter assembly, shall be provided by the Electrical Utility at the Contractor's expense. The Contractor shall contract directly with the Utility for all temporary power connection requirements. The point of demarcation for the Utility's electrical service will be the load side connections of the Electrical Utility provided meter assembly. The Contractor shall furnish and install all temporary service equipment on the load side of the utility service demarcation point. The Contractor shall coordinate all temporary service locations and requirements with the Electrical Utility, Laclede Electric Cooperative.

4. Project and Safety Signs

The requirements for the signs, their content, and location shall be as shown on the examples provided at the end of this section. The signs shall be erected within 15 days after receipt of the notice to proceed. The data required by the safety sign shall be corrected daily, with light colored metallic or non-metallic numerals. Upon completion of the project, the signs shall be removed from the site.

5. CONTRACTOR'S TEMPORARY FACILITIES

a. Administrative Field Offices

The Contractor shall provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

b. Storage Area

The Contractor shall construct a temporary 6 foot high chain link fence around trailers and materials. The fence shall include plastic strip inserts, colored green, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Trailers, materials, or equipment shall not be placed or stored outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the military boundaries. Trailers, equipment, or materials shall not be open to public view with the exception of those items which are in support of ongoing work on any given day. Materials shall not be stockpiled outside the fence in preparation for the next day's work. Mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment, shall be parked within the fenced area at the end of each work day.

c. Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but shall be within the military boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor shall be responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

d. Appearance of Trailers

Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers which, in the

opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on the military property.

e. Maintenance of Storage Area

Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Contractor's discretion. Grass located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

f. New Building

In the event a new building is constructed for the temporary project field office, it shall be a minimum 12 feet in width, 16 feet in length and have a minimum of 7 feet headroom. It shall be equipped with approved electrical wiring, at least one double convenience outlet and the required switches and fuses to provide 110-120 volt power. It shall be provided with a work table with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked. The building shall be waterproof, shall be supplied with heater, shall have a minimum of two doors, electric lights, a telephone, a battery operated smoke detector alarm, a sufficient number of adjustable windows for adequate light and ventilation, and a supply of approved drinking water. Approved sanitary facilities shall be furnished. The windows and doors shall be screened and the doors provided with dead bolt type locking devices or a padlock and heavy duty hasp bolted to the door. Door hinge pins shall be non-removable. The windows shall be arranged to open and to be securely fastened from the inside. Glass panels in windows shall be protected by bars or heavy mesh screens to prevent easy access to the building through these panels. In warm weather, air conditioning capable of maintaining the office at 50 percent relative humidity and a room temperature 20 degrees F below the outside temperature when the outside temperature is 95 degrees F, shall be furnished. Any new building erected for a temporary field office shall be maintained by the Contractor during the life of the contract and upon completion and acceptance of the work shall become the property of the Contractor and shall be removed from the site. All charges for telephone service for the temporary field office shall be borne by the Contractor, including long distance charges up to a maximum of \$75.00 per month.

g. Security Provisions

Adequate outside security lighting shall be provided at the Contractor's temporary facilities. The Contractor shall be responsible for the security of its own equipment; in addition, the Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

6. GOVERNMENT FIELD OFFICE

Resident Engineer's Office

The Contractor shall furnish a temporary office with a minimum of 900 square feet of floor space. It shall be located where directed and shall be reserved for Government personnel only. Provide a gravel parking area for a minimum of 3 vehicles and reserved for the sole use of the Government. Access from the parking area to the office shall be by elevated walkway or concrete sidewalks. The steps and landings at the doors shall be substantial.

The Contractor shall furnish bottled drinking water with cooler, thermostatically controlled space heat, ventilation and air conditioning, electric light (suitable for an office environment), electricity, and toilet facilities consisting of one lavatory, one water closet and one urinal. The toilet facility

shall be complete with hot and cold running potable water, sewer, and powered bathroom ventilation.

Utilities shall be connected and disconnected by the Contractor in accordance with EM385-1-1, local codes and to the satisfaction of the Contracting Officer. The facility shall be laid out and furnished as follows:

There shall be two private offices, one at each end of the facility. Each private office shall be furnished with one desk, two office chairs, two cushioned fold up chairs, one telephone instruments and one four drawer legal size file cabinet. Each private office shall also be provided with one 4'x6' white board with mounting hardware.

The center area between the offices shall be a conference area furnished with a minimum 16' x 3' conference table and 12 chairs. The center area will also have one desk with office chair. Provide one cordless conference phone in the center area. The center area shall also be provided with one 4'x6' white board with mounting hardware. The center area shall also be provided with one plans rack with a minimum of 10 rack clips and a minimum 6' x 2.5' plan table. The center area shall also be provided with one 3.7 cu. ft. compact refrigerator with full width freezer.

The Contractor shall provide a data communication (LAN) outlet and an electrical outlet in each corner of the private offices and a data communication (LAN) outlet and an electrical outlet in the center of each of the exterior walls in the center area. The Contractor is responsible for all internal wiring inside the building. All wiring shall be Category 5E or better. LAN wiring shall be home run from each LAN connection into a patch panel in a central area set aside for LAN and communications equipment. The contractor shall provide a 6' x 6' area in this central area near the patch panel for Government Furnished Government Installed LAN and communications equipment.

The Contractor shall provide land-line telephones. The Contractor is responsible for paying the first \$75.00 per month of long distance telephone charges from telephones installed at the jobsite trailer in addition to the normal monthly telephone charges.

Used furniture, in good condition, will be acceptable subject to approval of the Contracting Officer.

The office shall have an exterior door. The office shall have a second door allowing access to the bathroom facility and secondary egress. Both doors shall have substantial locks.

The Contractor shall provide janitorial service and janitorial consumables, fuel for the heating facilities, electricity, copier, fax and printer consumables including but not limited to toner cartridges and paper, hot and cold running domestic water at no cost to the Government. Janitorial service shall be after normal hours.

The Contractor shall provide a fireproof safe to store laptops. The safe shall be affixed to the facility and large enough to hold 3 laptops.

The Contractor shall provide bars on all windows in the facility and security bars for the exterior doors.

The entire facility including the furniture provided by the Contractor will remain the property of the Contractor and shall be removed from the site no sooner than 45 calendar days after completion of the work.

7. TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing at the work site. The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

8. CLEANUP

Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

9. RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

Appendix EE
Demarcation Matrix

WT COMPLEX DEMARCATION MATRIX			
#	Demarcation Item	(Barracks & Site RFP)	(SFAC & ADMIN-HQ RFP)
1	Site Layout	Layout of the entire project site. This includes the location of the Barracks, the Soldier & Family Assistance Center (SFAC) and the Administrative Headquarters (ADMIN-HQ) for the purpose of validating building relationships, setbacks (including anti-terrorism and force protection), utility connections and services, new utility construction, existing utility abandonment, and avoidance of future potential utility conflicts and rework.	Complete and final integration of SFAC building site, the Playground Area and the ADMIN-HQ building site into the overall Warrior in Transition Complex. This shall include all AT/FP measures, utility connections, extension of sidewalks, paving, landscaping and any and all other necessary construction required to provide a complete, functional and operational building and accessories
2	Demolition	Demolition of all roads, drives, sidewalks, parking areas and any and all other existing improvements throughout the project site as necessary. Demolition of all utilities as necessary in conjunction with utility relocations, removals and abandonments. Demolition is to include the removal and proper disposal of all material in accordance with all applicable Federal, State and Local requirements.	Not Applicable
3	Clearing and Grubbing	All clearing and grubbing shall be as recommended by the Design-Build Contractor's Geotechnical Investigation.	Stripping may be required if vegetation has started to reestablish on pad site
4	Site Grading	All site grading as necessary.	Finish grading within the building envelopes.
5	Roads	Provide all roads, streets, access drives, parking areas, bus stop along Nebraska Avenue, drop off areas and emergency routes.	Finish grading within pad site
6	Permits	Obtain all permits required for construction of all infrastructure and Barracks. This includes but is not limited to earthwork, environmental, debris removal and disposal, utility construction/extension/relocation and abandonment, NPDES, operate on Fort Leonard Wood	Obtain all permits required for construction of SFAC, Playground Area and ADMIN-HQ, including but not limited to grading, building construction, NPDES and utility and infrastructure connections

7	Storm Sewer	Responsible for the design and construction of the storm sewer and storm water detention system within the site	Provide roof drains and downspouts to turf areas or connect to enclosed storm sewer system if capacity exists.
8	Domestic Water	Responsible for design and construction of a water distribution system between the main line and the building sites to provide adequate water to each building, including a water meter	Provide water service from buildings to meter as provided by Barracks Design-Build Contractor. Coordinate connection with Barracks Design-Build Contractor.
9	Fire Water	One separate fire sprinkler service connection is to be provided within the Barracks. Responsible for the connection of the supply line to the main water distribution line, for all piping between the connection with the main water distribution line and the fire post service post indicator valve (PIV) for the Barracks. Provide and install the PIV for the Barracks. Design and installation of the fire sprinkler service line for the Barracks. Responsible for the design and installation of the fire supply line between the connection with the main water distribution line and a point within five (5) feet of the building(s). Coordinate the location of the point of termination of the fire supply line with the second Design-Build Contractor for the SFAC and ADMIN-HQ buildings. A separate line is required for each building.	Provide piping between buildings and the PIV as provided by Barracks Design-Build Contractor.

10	Sanitary Sewer	Responsible for the design and construction of the sanitary sewer service line between the sanitary sewer main and each building site within the facility in accordance with all applicable requirements.	Provide sanitary sewer from buildings to clean out provided by Barracks Design-Build Contractor. Coordinate connection with Barracks Design-Build Contractor.
11	Gas service	Provide connection to the meter/regulator provided by Omega Pipeline Company. Provide and install any interior reducing regulators as required.	Provide connection to the meter/regulator provided by Omega Pipeline Company. Provide and install any interior reducing regulators as required.
12	Side Walks	Responsible for the sidewalk network required for access from all parking lots and to all buildings and for an interconnected sidewalk between the building sites, a sidewalk from the SFAC to the bus stop, and an ADA accessible route to connect the Barracks and SFAC to the easterly curb line of Illinois Avenue, such that said accessible route aligns with the existing emergency entrance to the adjacent Fort Leonard Wood Army Community Hospital.	Provide all sidewalks within the Limits of Construction and connect to sidewalk network. Coordinate connection with Barracks Design-Build Contractor.
13	Parking Lots	Provide all parking lots	Not applicable.
14	Landscaping	Provide all landscaping per Design-Build Contractor's Landscape Plan	Provide landscaping per Design-Build Contractor's Landscape Plan
15	Turf	Provide all turf per Design-Build Contractor's Landscape Plan	Provide all turf per Design-Build Contractor's Landscape Plan
16	Sustainable design / LEEDS	Minimum as agreed per the scorecard	Minimum as agreed per the scorecard

17	Building HVAC/ mechanical system equipment	Provide all equipment pads and piping required for the Barracks building systems.	Provide all equipment pads and piping required for each of the Admin facilities' building systems.
18	Electrical Service	Coordinate transformer location with the Ft. Leonard Wood DPW via COE's CO. Provide secondary conduits to within 1-2 feet of the transformer pad and the secondary cables with 15 feet of slack. Laclede Electric Cooperative will provide the primary service, transformer, transformer pad, and primary and secondary terminations. Provide conduit from the metering enclosure to the DDC equipment location.	Coordinate transformer location with the Ft. Leonard Wood DPW via COE's CO. Provide secondary conduits to within 1-2 feet of the transformer pad and the secondary cables with 15 feet of slack. Laclede Electric Cooperative will provide the primary service, transformer, transformer pad, and primary and secondary terminations. Provide conduit from the metering enclosure to the DDC equipment location.
19	Electrical & Telecommunications General note	Coordinate with the Admin facilities' contractor via COE for connection of underground raceways. Seamless transition of conduits between the site and the Admin facilities is preferred.	Coordinate with Barracks and Site contractor via COE for connection of underground raceways. Seamless transition of conduits between the site and the Admin facilities transition is preferred.
20	Site & building lighting	Lighting, normal and emergency egress design and installation for the barracks building to include security lighting on its perimeter. Site lighting design and installation including parking areas, paths to the public way and the bus stop. All site and parking lot lighting shall be powered and controlled from the barracks building.	Lighting, normal and emergency egress design and installation within 10ft of each building to include security lighting on each buildings' perimeter.

21	Communications OSP Duct bank	Complete conduit system installation including manholes and the manholes adjacent to the barracks building and the two admin buildings. Route the duct bank into the barracks building and to a distance of 5 feet from each Admin buildings' foundation. Coordinate with the Admin Facilities contractor via COE for connection of the underground raceways.	Route the OSP service conduit out 5 feet past each buildings' foundation. Coordinate with Barracks and Site contractor via COE for connection of the underground raceways.
22	Communications OSP cabling	Pull the copper and fiber optic (FO) cables copper into the barracks' communications room. Terminate cables (CU & FO) to respective termination boards. Provide 20 ft slack in cables neatly coiled.	Provide copper (CU) and fiber optic (FO) cables from the Barracks Communications room to the communications rooms in each of the SFAC and Admin-HQ buildings. Terminate cables (CU & FO) to respective termination boards. Provide 20 ft slack in cables neatly coiled.
23	Cable Television (CATV) Service	Handholes adjacent to the barracks building and the two admin buildings. Route the conduit from the handhole into the barracks building and to a distance of 5 feet from each Admin buildings' foundation. Provide the CATV enclosure & power per the requirements of the CATV system supplier.	Route the CATV service conduit out 5 feet past each buildings' foundation. Coordinate with Barracks and Site contractor via COE for connection of the underground raceways. Provide the CATV enclosure & power per the requirements of the CATV system supplier.
24	CCTV, Public Address (PA), & Intrusion Detection System (IDS)	Provide dedicated pairs over telecommunications OSP. Cross-connect in from the telecommunications system to the CCTV and PA systems in the communications room.	Provide dedicated pairs over telecommunications OSP. Cross-connect in from the telecommunications system to the CCTV, PA, and IDS systems in the communications room.

25	Building Management System (BMS)	Provide dedicated pairs over telecommunications OSP. Cross-connect in from the telecommunications system to BMS system in the communications room. Coordinate number of pairs.	Provide dedicated pairs over telecommunications OSP. Cross-connect in from the telecommunications system to BMS system in the communications room. Coordinate number of pairs.
26	Mass Notification System (MNS)	Provide the MNS in the barracks and cables and conduit for connection to the Admin facilities. Install any giant speakers which are required on the WT complex site.	Route the MNS conduit out 5 feet past each buildings' foundation. Coordinate with Barracks and Site contractor via COE for connection of underground raceways. Seamless transition of conduits between the site and the Admin facilities transition is preferred.